NORMAN D. VAUGHAN
1905 – 2005

THE POLAR TIMES

NORMAN VAUGHAN CONQUERS HIS NAMESAKE MOUNTAIN.

THE POLAR TIMES

July 2006

President's Letter

I am very happy and proud that you have elected me to serve as your president for the next two years. I look forward to working with the Board of Governors, including our two new members Bob Rutford and Jim Collinson.

This year is the fiftieth anniversary of my first trip to Antarctica when I sailed on a U.S. Navy ship as a graduate student to participate in the International Geophysical Year (1957-1958). As I look forward the International Polar Year (2007-2008) I realize that we who traveled south at that time were as close in time to the Scott, Shackleton and Amundsen era then as we are now are to the IGY. I also worked in Alaska and even got to Ice Station Charlie in those early years, which I hope gives me at least token bi-polar experience. A number of our members who participated in IGY in the Arctic and Antarctic can serve as a bridge to the young scientists and other participants in IPY. IGY marked the transition from the "heroic" age to the "scientific" age, possibly epitomized by the fact that we used Sno-Cats rather than dogs to explore the Antarctic Ice Sheet. Young researchers now take satellites for granted for both routine and cutting edge research. Recall that the symbol of IGY was a satellite circling the earth, and two USSR and two US satellites in IGY made significant discoveries.

During my tenure as your as president for the next two years I hope we can contribute to research and outreach in the IPY.

John Behrendt

APS President

Past President's Letter

It is with great pleasure that I welcome the new President of the American Polar Society, Dr. John C. Behrendt, and also the Vice-Presidents on the same ballot, Dr. Robert H. Rutford, Jeff Rubin, and Dr. James Collinson. Kevin Bjella, APS Secretary, is to be commended for managing the vote procedures, which he describes in his column. I have known John Behrendt since 1960, when I arrived as a new USARP at Byrd Station, and he was already there, preparing for his summer of field work. His polar experience at that time was impressive and formidable, which included wintering. I recall asking for his help in manipulating the ham radio equipment at Byrd so that successful contact could be made with an operator in the U.S. His career as a scientist and specialist on Antarctica is well known, and I am confident that he will lead the Society and its members in a direction we can all be proud of.

I wish to say a few words about how the ballot came about, since I decided last year that more than two years was enough for my tenure, and it was time to turn over the reins to another. Being familiar with the protocols for soliciting the position to be filled, I contacted by telephone and email message members of high standing in my eyes in the Society, and keeping with the principles of equal employment opportunity. Potential candidates thus included females and males alike, several who had Arctic or Antarctic experience, or both, several with military career backgrounds in polar regions, and several who had been recommended to me by members as likely candidates. Some responses were positive, but in many cases, circumstances did not permit the option of being on the ballot presently, but maybe at a later time. I was assisted by Society Vice-Presidents in this search, and value their judgment and comments in arriving at the final list of candidates. Changes of names and titles are evident in the masthead of this issue of The Polar Times as a result of the election, as well as a result of revision of the Society's Constitution. Please note that our distinguished Editor for many years is now Managing Editor, a reflection of the breadth of the responsibility related to providing Society members with a professional product.

A lengthy process was made in the last year to provide an updated revision of the Society's Constitution and Bylaws, and I am pleased to say that constructive comments were made by several members, and a new version has been reviewed by the Board of Governors. It will receive formal adoption at the next meeting of the Board, timed with a Symposium now in the planning stages for Spring 2007.

I have enjoyed my tenure as President since 2003, and the camaraderie and interaction with members has kept me in the polar loop. The Society is as strong as its members, and I believe we have that strength.

John Splettstoesser

Past President

About Our Front Cover

"Norman Vaughan Conquers His Namesake Mountain"—The Spring-Summer 1995 cover of *The Polar Times* featured this photo of Norman Vaughan at age 89. Inside that issue was the story of how he had, the previous December, finally climbed his namesake peak, 10,302-foot Mount Vaughan, in the Antarctic—65 years after it was named for him by none other than Adm. Richard Byrd himself. Because of a fused ankle and knee replacement, Vaughan had to climb straight up, using 7,128 footsteps hacked out of the ice with a pickax by lead climber Vern Tejas. ❑

About Our Back Cover

View from Peterman Island—Our artist, Dr. Lida G. Chase, has been an APS member since 1998 and has been to the Antarctic four times. She was, for 27 years, a member of the faculty of the College of Health Sciences at the University of Hawaii-Manoa. Upon early retirement, she became a Docent at the Honolulu Academy of Arts, where she has now served ten years. She is a member of both The Nature Conservancy and The Ocean Conservancy. Dr. Chase is a print maker by avocation. Her drawing that appears on the back of this issue emerged in October 2001, after her trip to the Ice in 2000. It is of the spectacular view across Penola Strait from Peterman Island, toward Duseberg Buttress and Mount Scott. Peterman Island is located at 65° 10' S, 64° 10' W across Penola Strait from the Graham Coast of the Antarctic continent. The drawing is a black-and-white lithograph to which color is added in the areas of sky and sea, upon request of the patron; each print is then labelled as an "Artist's Proof" and is unlike any other in the "edition." ❑

American Polar Society

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are $15 a year ($17, foreign) and entitle members to receive ***The Polar Times*** twice a year. The American Polar Society is classified as a tax exempt organization under Sec 501(C)3 of the IRS Code. For more information about the American Polar Society, contact Kevin L. Bjella, ***APS Secretary***, at 1.802.295.6881 or send email to kevin.bjella@erdc.usace.army.mil.

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Ultimate North: The Storm at the Top of the World

by Tom Avery

Who was the first person to stand at the North Pole? There are many theories, but nobody knows for sure. Some believe it was Commander Robert E. Peary who, along with the African-American Matthew Henson, four Inuit men and 40 dogs, claimed to have reached the North Pole on April 6, 1909, after a journey of over 400 miles across the most hostile environment on Earth. He sacrificed 23 years of his life in various attempts to achieve his ultimate ambition, losing eight of his toes in the process but in 1909 he achieved his lifetime ambition after a journey of just 37 days,

Expecting to be hailed a national hero back home, Peary returned to New York to find that most of America had only three days previously heard the news that Dr Frederick Cook had beaten him to the Pole on a separate expedition. Although Cook was eventually proven to be a fraud (he also faked the first ascent of Mt McKinley in Alaska and would later be convicted for fraudulent business activities), the huge public scepticism that arose during the fierce Peary-Cook controversy never really died down,

It became clear to me that the questions would continue to be asked until somebody tried to recreate Peary's final expedition as closely as possible and show that the travel speeds he claimed really were possible.

Training began in earnest in February 2004, when our team (three Brits, two Canadians) got together in Baffin Island, high in the Canadian Arctic, for a three-week intensive dog driving programme. At the time, 188 people had reached the Pole since Peary, and nobody had come close to repeating his time of 37 days. The fastest time that anyone has managed since 1909 was 43 days by a Canadian party in 2000. Typically, an expedition to the North Pole takes 60 days, and only one in four attempts to reach the Pole end in success.

To press his case as strongly as possible, we set out to simulate Peary's journey as closely as we could. Peary used the Eskimo dog from northwest Greenland on his 1909 expedition. Like Peary, we travelled with the Eskimo dog and used eight dogs per sled. We took a total of 16 dogs, which were selected from a larger squad of 22 animals. The Eskimo dog is still considered the best expedition dog in the Arctic, although there are less than 500 pure breeds left in the world and their future remains uncertain.

Perry and Henson were expert navigators, They spent several years surveying for a proposed sea-level cross-isthmus canal through Nicaragua, under the auspices the Maritime Canal Company, in association with the U.S. Government. The Inuit who traveled with Peary were also highly skilled navigators themselves. Traveling in the Arctic was in their blood, and Peary learned to adopt their techniques. Like Peary, we were able to maintain our course by traveling with sun, shadow, wind direction and sastrugi and by checking our compasses in overcast or snowy conditions.

Peary built wooden sleds that resembled those used by the Inuit for travel and hunting, reinforced to withstand the rugged terrain of the sea ice. We built two sleds from Canadian Spruce, of the same dimensions and design to the Peary sleds. Just like Peary's sleds in 1909, the loads never exceeded 500 pounds.

The flight from the weather station at Eureka (the most northerly community on Earth) to Cape Columbia was utterly spellbinding as we floated over an Arctic landscape of glaciers, high mountains and vast ice caps. For over two hours we saw not a trace of human civilization, not even a road or a telegraph pole. Located on the northern shore of Ellesmere Island, this is the place from where Peary launched his final attempt on the North Pole. Here he established a base camp called Crane City, which we replicated, though on a smaller scale. This gave us a day or two to rest the dogs before setting off and the chance to explore some of this historic coastline.

To the south of our camp lay a seemingly impenetrable fortress of icy peaks, stretching as far as the eye could see to the east and west. We were hoping to find some evidence of Peary being here, but nothing could have prepared us for the treasure trove that we discovered hours after our arrival at the Cape.

Armed with some old photographs from Peary's 1909 expedition, we found the location of Crane City by lining up the existing terrain with two recognisable mountains in one of the photos. We began searching through the snowdrifts and a small scree slope at the foot of one of the peaks and soon began unearthing wooden crates, tin carts, fuel canisters and even an old sledge runner. Having been researching this fascinating character for the best part of two years, I could scarcely believe we had actually stumbled across his base camp. Nobody had been there since Peary and his men packed up camp for the final time and returned to civilization. It felt as though they only left a few weeks earlier.

Three miles to the west of Crane City, we spotted a wooden signpost on a headland below the twin peaks of Mount Cooper Key. As we headed toward it, it quickly became apparent that it had been built by Peary to mark his attainment of the North Pole in 1909. With lines of galvanized iron securing it firmly to the ground, it was still standing proud, and the writing was exceptionally clear. We stared at it in silence, completely overwhelmed. It was a very moving experience.

Global warming has transformed the Arctic ice pack since Peary's day, and the early arrival of the Arctic summer means that it is no longer possible to make the return journey to the Pole and back to land. The ice pack has reduced in thickness from an average depth of twelve feet in Peary's day to less than eight feet today. And some time in the next decade, thin ice will make it impossibly dangerous simply to make the one way journey from land to the North

Pole. So we may well find that ours is one of the last successful North Pole expeditions in history.

We left the Cape on 20 March 2005 on a bitterly cold morning. Nothing could have prepared me for the frigid temperatures we encountered during those first three terrible weeks. The mercury never rose above -32°C, but typically it hovered around the -40°C mark. This is far colder than we ever experienced during our two-month expedition to the South Pole in 2002. Little works in those temperatures, and for much of the time you are forced to stop in your tracks to thaw out your fingers by swinging your arms around like windmills.

As the ocean currents and winds drive the ice pack against the coast of Ellesmere Island, it buckles up to form giant pressure ridges that guard the route to the north. These often took more than twenty minutes to negotiate, particularly if the snow was soft, as the sled would end up getting buried or jammed behind solid ice boulders. Lots of digging with shovels, chopping chunks of ice with the axe and encouraging the dogs meant that there was often a lot of effort involved for very little distance gained. This was made all the more challenging with fully laden sleds. But the excitement of at last being under way, and with Peary's spirit watching over us, our morale remained high.

Forty miles off the coast of Ellesmere Island we found ourselves in what can only be described as a war zone, with chunks of thick blue ice piled high wherever we looked. Like Peary, we adopted the practice that if you can't see an alternative route to the left or to the right without going off and looking for one, you just go straight ahead and hope for the best. It never ceased to amaze me how our replica Peary sleds stood up to the constant battering. And the dogs just never gave up. On several occasions the sleds actually left the ground as they hurtled back down the other side of a pressure ridge before crashing into the next wall of ice. As the sleds careered down a pressure ridge, we often had to take avoiding action, and most of us sustained injuries as the sled's handles bit us on its way through or we became entangled amongst the dog lines. Incredibly, none of these injuries were serious enough to warrant being evacuated from the ice. We were extremely fortunate.

Like Peary, we built the sleds with rope. Not a single nail or screw was used in their construction, which allowed them to flex as they glided through the uneven terrain.

As the temperatures inched their way up to the minus twenties, the monster pressure ridges we encountered over the first few weeks gradually began to give way to large pans of ice, interspersed with leads of open water. As Peary had experienced in 1909, this became a threat, not only to our northerly progress but also to our very survival.

At first it was the dogs that fell through the thin ice. Then it was the sleds. Even though the sleds contained all our food and equipment, we had grown so close to the dogs that on Day 22 when Marvin, Zorro and the first sled fell through a lead, we all rushed over to pull the drenched dogs out before we did anything else. To prove just how hardy they are, the dogs just shook themselves dry, rolled around in the snow to soak up the salt water and then carried on as if nothing had happened.

On Day 27 we came to a narrow lead of no more than eight foot in width, and we set about trying to build a temporary snow bridge which we could use as a crossing point. Not realising that the piece of ice he was standing on was overhanging, George suddenly disappeared from view as the ledge gave way, dunking George underwater. Human beings can only survive for a few minutes in the icy water of the Arctic Ocean, and we had to get him out of there as quickly as possible,

The first the rest of us knew about it was the loud shriek we heard from inside the lead. With over two miles of ocean beneath him, there was no chance of him touching the bottom. After bobbing about in the water for a few moments, George managed to clamber out to safety. If getting out of the swimming pool was ever made an Olympic sport, his panic-induced exit from the water would have broken many records.

Thankfully the wind had died down, so after changing George's outer layers of clothing, we were able to continue travelling, his sodden boots squelching with every step. In this type of situation, it's much better to keep moving and try to maintain some warmth than to stop. The body would cool down dramatically, frostbite and hypothermia could set in quickly and things would rapidly turn into a battle for survival.

On some days we encountered 40 or 50 open-water leads, and everyone got at least a leg wet. It's a strange sensation when you go in. Your initial feeling is one of surprise because the water feels abnormally warm. But things soon begin to chill, and your trousers quickly turn solid as the water freezes.

Most of us suffered some degree of frostbite, mostly to the face and fingers. And three months after our return from the ice, my big toes are still numb.

After successfully crossing a giant lead of nearly two miles in width on Day 34, we thought we had reached the Promised Land—pan after pan stretching all the way to the northern horizon with no signs of open water. The perfect travel conditions continued for the next three days—no pressure ridges, no leads, just flat hard-packed snow and the occasional frozen lead, meaning we had really been able to up the pace.

When Peary made his five-day, 133-mile dash to the Pole from Bartlett Camp in 1909, these were just the conditions he described in his journal. It was now very easy for me to see how he could have made the big distances he claimed.

But what Peary didn't have in 1909 were the strong headwinds that had plagued us since we crossed the giant lead. The northerly winds caused the ice pack to drill south at an alarming rate of over seven miles a day.

Had there been no drift, our daily mileage for that final stretch would have been around 27 or 28 miles a day. This is all part and parcel of travelling in the Arctic, and Peary himself would have suffered from negative ice drift, but to happen so close to the Pole felt like daylight robbery. We were all going through a real emotional roller coaster during those final days—pleased to have such a great surface to travel on and to have the Pole almost within sight, but intensely frustrated to be drifting south so quickly. Each morning we would wake up to find that the Pole was three miles further away than it had been the night before.

In order to match Peary's time (37 days and 2 hours, to be precise), we needed to arrive by 11:20 a.m. on 26 April. With a healthy twelve hours left on the clock, just three miles separated us from the Pole, But you should never take anything for granted in the Arctic, and just as we were beginning to get excited about our imminent arrival at the top of the world, the clouds rolled in, and just above the horizon we could see three thin black water clouds, indicating that open water was not far away.

Sure enough, the flat pans that we had enjoyed over the last few days disappeared, and we soon found ourselves in an area of rough ice and our first leads in over 50 miles. The first of these was over a quarter of a mile wide but even though it flexed with every step, the ice was just thick enough to support our weight, and we were soon safely across,

But Sedna (the Inuit goddess of the sea) had one final surprise for us. We crossed a few more freshly frozen leads before coming to one of no more than 50 yards in width that remained unfrozen in the centre. It stretched

from east to west as far as we could see, completely blocking our path to the Pole. We were all completely exhausted by this stage, the dogs included, and we needed all our powers of patience as we searched for a way across.

We started by looking to the east but soon gave up when it became clear that the lead splintered off into a series of fresh open leads. So we turned back on our tracks and headed off in the other direction, wondering if we would ever find a way to the Pole at all.

Our first attempt to cross nearly ended in disaster when Raven's team broke through the thin ice, all of them ending up in the water in the centre of the lead. Amazingly, the sled did not go through and, with the five of us calling to than from the near bank, the dogs were able to haul themselves out of the water, turn around and pull the sled to safer ice. It was a heart-stopping moment but the dogs soon dried off and were able to carry on as normal.

After what seemed like hours, we finally made it across a stretch of slightly thicker ice, and soon we were making our final steps to the Pole, which was located on a small flat area of snow no larger than a tennis court and surrounded by pressure ridges. We counted down the last sixty feet to the Pole on the GPS side by side and arrived just after 7:30 a.m. local time. We hugged, laughed and cracked open the champagne. We had done it,

There were times when I genuinely believed that we might not make it, but to be standing at the North Pole, the centre of the Earth's axis, looking south in every direction, felt absolutely incredible. It was the fulfillment of a dream I had harboured for many years.

The admiration and respect which I hold for Robert Peary and his men has grown enormously since we set out from Cape Columbia. Having now seen for myself the terrain across which Peary traveled, and used the same methods of travel and navigation as he did, I have no doubt whatsoever that Peary was capable of reaching the Pole in the time he claimed and was the true discoverer of the North Pole. Driving dogs is the most efficient way to travel up there, and whether you are resupplied by air drops or by support parties on the ice, the travel speeds that Peary claimed to have achieved seem highly reasonable. If our motley crew of amateur adventurers could make it to the Pole in 37 days, then of course Peary's team, with all their many years of dog driving experience, could have done it too.

I hope that our journey has finally brought an end to the debate. ❑

The Barclays Capital Ultimate North Expedition Team

Tom Avery

TOM AVERY was born in December 1975 and brought up in Sussex, England; Brazil; and France. His passion for adventure began when he was eight years old and first read about the exploits of Captain Scott. From that day he knew that one day he had to go to the Poles.

Avery's outdoor career began at 16 with a series of rock and ice climbs in Wales and Scotland. At university, he organized and led mountaineering expeditions to the Andes, New Zealand, the Alps, Tanzania, Patagonia and Morocco. The pinnacle of Avery's climbing career was in 2000 when he led a pioneering British expedition to a previously unexplored 20-mile mountain range close to China's western border. His team scaled nine unclimbed and unnamed summits up to 6,000 meters high.

On 28 December 2002, just days alter his 27th birthday, Tom Avery walked into the record books by becoming the youngest Briton to complete the perilous journey to the South Pole. His team managed to break the South Pole speed record by using state-of-the-art kites to power them across the ice and covering the last 47 miles to the Pole in a marathon 31 hours.

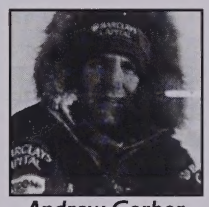
Avery has now accomplished the biggest challenge of his polar career. The Barclays Capital Ultimate North Expedition has solved the greatest polar mystery of all time: Commander Robert Peary did discover the North Pole in 1909 in a record 37 clays.

Hugh Dale-Harris

HUGH DALE-HARRIS, 32, is a teacher and musher (dog sledger) who lives in Thunder Bay, Ontario, with his partner Amy, their 20-month-old daughter Wynne and his dog team.

In 1996, Dale-Harris started working for the Canadian Outward Bound Wilderness School. Eighteen months later he took part in his first dog-sledging trip and has never looked back. Since then he has led dog-sledging trips for Outward Bound as well as accumulating hundreds of solo dog-sledging miles in northern Ontario and Quebec with his own team of Canadian Inuit dogs.

The highlight of his mushing career to date took place in 2004 when he took part in a groundbreaking 3000-mile dog-sledging journey across Canada's frozen north. The expedition lasted over five months, recording important climate data for NASA.



Andrew Gerber

ANDREW GERBER, 29, lives in London and works as a management consultant. While living and working in Sweden, he became a proficient cross-country skier, but in 2002 he left to join Tom Avery on the Commonwealth South Pole Centenary Expedition.

On 28 December 2002, the team managed to break the South Pole speed record by using state-of-the-art kites to power them across the ice, covering the last 47 miles to the Pole in a marathon final 31 hours. Following the success of their South Pole expedition, Avery asked Gerber to join him on The Barclays Expedition, traveling to the North Pole with dogs and sledges. Being raised in South Africa, Gerber spent much of his childhood outdoors, but prior to the South Pole he had little experience of cold weather!

Matty McNair

MATTY McNAIR's passion for Polar travel is amazing. In 1990, she traveled 4,000 km around Baffin Island by dog sled. 1997 saw her leading the first woman's expedition to the North Pole. In 2000, she led an expedition across Ellesmere Island through Sverdrup Pass. Then in 2003/04, she led two ski-all-the-way expeditions to the South Pole. In May/June 2003, she crossed the Greenland Ice Cap with her children, Sarah and Eric, by ski-kites, with dog sled support.

Coincidently, like Peary, McNair was born in Pennsylvania (though now holds dual American/Canadian citizenship) and is now the same age as Peary was when he discovered the North Pole in 1909. She started skiing at age 2, qualified for the national whitewater slalom championships when she was 15, biked with her family across Europe, competed in cross-country ski races throughout Colorado in the 1970s, climbed in Peru and Bolivia in the 1980s, and moved her family to the Canadian Arctic in the 1990s.

George Wells

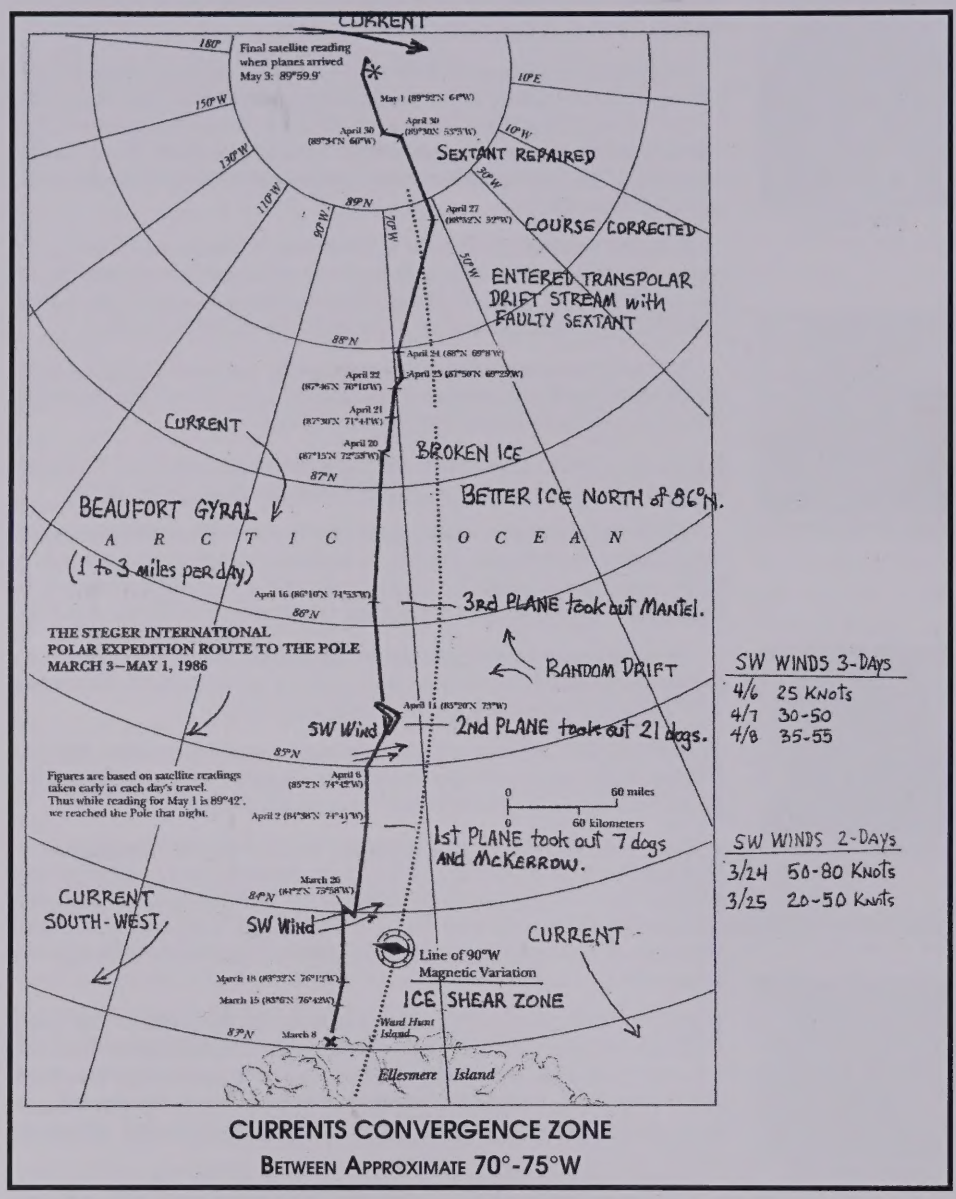
GEORGE WELLS, 28, grew up in Suffolk, Oxford, and Bristol. A passion for climbing and exploration started with trips to the Alps. This led to adventures on mountain ranges around the world, including the High Atlas and the Andes.

Wells met Tom Avery in 1996—a meeting of similar minds which was destined to result in great adventures. He joined Avery on the Silk Mountains Expedition in 2000—a pioneering British expedition to a previously unexplored 20-mile mountain range close to China's Western border. Over a six-week period, the team scaled nine unclimbed and unnamed summits up to 6,000 metres high in the Eastern Zaalay Mountains of Kyrgyzstan.

Just when life was threatening to fall into a routine, Avery asked Wells if he would like to join his team on one of the greatest adventures of his career to date: the Barclays Capital Ultimate North Expedition, traveling to the North Pole with dogs and sledges. A period of training on Baffin Island in the winter has led him to wonder why he said yes so quickly! ❑

The Pole Seekers: A Comparison

by Captain Donald M. Taub, USCG (Ret.)


CURRENT
Final satellite reading when planes arrived May 3: 89°59.9'
SEXTANT REPAIRED
COURSE CORRECTED
ENTERED TRANSPOLAR DRIFT STREAM with FAULTY SEXTANT
CURRENT
BROKEN ICE
BEAUFORT GYRAL
BETTER ICE NORTH of 86°N.
A R C T I C O C E A N
(1 to 3 miles per day)
3rd PLANE took out MANTEL.
THE STEGER INTERNATIONAL POLAR EXPEDITION ROUTE TO THE POLE MARCH 3—MAY 1, 1986
RANDOM DRIFT
SW WINDS 3-DAYS
4/6 25 KNOTS
4/7 30-50
4/8 35-55
SW Wind
2nd PLANE took out 21 dogs.
Figures are based on satellite readings taken early in each day's travel. Thus while reading for May 1 is 89°42', we reached the Pole that night.
60 miles
60 Kilometers
1st PLANE took out 7 dogs and McKERROW.
SW WINDS 2-DAYS
3/24 50-80 KNOTS
3/25 20-50 KNOTS
CURRENT SOUTH-WEST
SW Wind
CURRENT
Line of 90°W Magnetic Variation
ICE SHEAR ZONE
Ward Hunt Island
Ellesmere Island
CURRENTS CONVERGENCE ZONE
BETWEEN APPROXIMATE 70°-75°W

Three expeditions to the North Pole by dogsled are here compared; that of Robert E. Peary in 1909, of Will Steger in 1986, and that led by Tom Avery in 2005.

The Barclay's Capital "Ultimate North" expedition to the North Pole led by Tom Avery in 2005 in 37 days confirmed Robert E. Peary's successful 37-day expedition in 1909. Avery's expedition closely duplicated Peary's route of 413 nautical miles by dogsled and many of his methods. Their sleds were of the same design and load weights, and the expedition included a 53-year-old female member, the same age as Peary in 1909.

The expedition led by Will Steger and Paul Schurke in 1986 also closely paralleled Peary's. All three expeditions were done without external material support. Like Peary, Steger's navigation was done solely by sextant, magnetic compass, and visual sastrugi wind surface markings and was accurate to within less than one mile of the North Pole as confirmed by Global Positioning System (GPS). In various ways these 1986 and 2005 expeditions were more difficult than Peary's, yet matched key aspects of Peary's speeds.

Avery's 2005 trek matched Peary's total time of 37 days to the Pole and, except for bad weather near the end, they likely would also have matched or exceeded Peary's final five-day dash speed between 88° N and 90° N. Steger's 1986 trek did match Peary's speeds in their last five days of northward travel, but took six days with no headway on the fifth day due to problems with their sextant. Their progress was monitored externally by GPS for safety purposes and showed that their travel path was essentially a straight line to the pole.

While these three expeditions were very similar; there were significant differences. Peary's pioneering trek was easier for several reasons. Global warming has since altered the polar pack ice. Avery stated that the average ice thickness in 2005 was less than 8 feet. Steger reported it at 10 feet in 1986 compared to 12 feet in Peary's time. This thinning lends to more breaking ice with more raised pressure ridges, more open water and more drifting. Steger and Avery also started onto the polar sea ice later in the season than Peary did.

Peary's teams took to the sea ice on Feb. 28 with sled loads of less than 500 pounds and reached the pole on April 6, 1909. Steger's party set out on March 8 with sled loads of 1200 pounds. This required back and forth relaying of supplies during their first 24 days, thus tripling their travel distance until they got beyond the shear zone's rough ice. Here they encountered an early start of the spring ice break-up, so they didn't reach the pole until April 30, 1986, for an exhausting total of 53 days.

Avery's party set out still later on March 20 and reached the Pole on April 27, 2005. They were occasionally hampered by periods of strong head winds that caused the ice to drift south. Per Avery, had this not occurred, they would have averaged about 27 to 28 miles per day for that final dash, 88°N to 90°N (120 miles). (Peary's final five-day dash average speed was 25 miles per day for his last 125 miles, or 26.6 miles per day for his last 133 miles, depending upon which distance was counted as his final dash.)

Then there was the different manner and make-up of the travel parties in the number persons, sleds and dogs. Avery and Steger were handicapped by what they started out with to the pole. Peary had the benefit of others designated to break the trail and set the course. Two experienced Arctic navigators did most of it: Capt. Robert Bartlett for 19 marches, Professor Ross Marvin for two marches, and Matthew Henson for four marches.

The magnetic compass variation was found to be essentially constant on their longitude by observations of the Sun at noon and later

REVIEWS: "So Many Great Books & Movies...So Little Space!"

Addendum to The Polar Times • July 2006 • Vol. 3, No. 9

Innocents in the Arctic: The 1951 Spitsbergen Expedition

By Colin Bull, 2005

Fairbanks, University of Alaska Press, xviii + 254 pp. Illustrated, color, hardcover, Index, $34.95

Review by John Splettstoesser, APS Past President

As expedition accounts go, this one is exceptional. First of all, the organization to explore a remote area of the island of Spitsbergen in the Svalbard Archipelago has everything possible going against it, from inadequate financial support to procuring an expedition ship and appropriate field gear, and then miserable weather in the area of their field work. A mix-up here and there resulted in forgetting to take along thermometers, somewhat uncertain assignments of duties of the field team, no means of communication, and shortages of food; but, on the positive side, despite all shortcomings, there was valuable scientific information resulting from this ten-man expedition of recent graduates from the University of Birmingham, England, in the summer of 1951.

The main character in the story is the author and participant, Colin Bull, who received B.Sc. and M.Sc. degrees in Physics from the University and who, at 23 years of age, was an important cog in the whole system. After many years, Colin assembled journal diaries and notes from the other members of the expedition and added his own thoughts and text to compile a very readable account of what actually happened when they conducted field work in a western fjord of Spitsbergen in 1951. It resulted in an interesting story, kept readable by the occasional interventions of Colin's humor, personality analyses and general camaraderie among all members. Somehow, they all survived, became life-long friends and held many reunions through the years to recount their impressions of the expedition. Photos of the eight survivors, 54 years later, appear on p. 216, and they are all smiling; so grudges, if there were any, disappeared long ago.

It can be speculated that living in confined conditions in tents that were designed for two people was exacerbated when it was necessary for three team members to occupy it, and thereby having to deal with each other's space problems. To save money, they had not bought fly sheets, leading to persistent saturation of water-soaked sleeping bags and other gear, in what seemed to be eternally bad weather, mostly of the wet kind. Page 164 sums it up: "Dennis spilled the porridge, Ted spilled the milk, Phil was annoyed."

Four geologists were included in the team, and the others providing assistance in not only backpacking of rock samples and other expeditionary tasks, but with Colin also showing considerable support as a cook, with sufficient innovation and imagination to come up with interesting expeditionary cuisine. The statement on page 20 probably sums it up, by stating that "pemmican is man's best attempt to stuff a whole cow into a one-pound can."

Somehow, they all survived—not only Colin's cooking, but also the occasional incidents of hazardous survival in the elements. No polar bear encounters were noted but, instead, the field team accomplished an unexpected amount of work on the geology of West Spitsbergen, a major objective of the expedition. A list of 15 publications on p. 245-246 confirms that this was no amateur group; they paved the way for further work in the area.

The work area was dictated by the results of an earlier expedition, in 1948 and by the logistic transport of the expedition, which deserves some elaboration. After the *Lyngen* voyage to Longyearbyen, they reached their field area in the governor's ketch. To get to Spitsbergen today, it is a simple matter to board an SAS aircraft at Tromsø, Norway, and land at the well-equipped airport at Longyearbyen. Field work in remote areas, however, requires ship transport for the most part, and the area chosen for the Birmingham University group was in St. Jonsfjorden, a major fjord north of where Longyearbyen is located, and on the south side of the fjord, affording ample conditions for work on foot without the use of a small boat. The map on p. 97 provides details. The fact that they did what they did is remarkable and paved the way for events that followed in their lives. The author asked each member how the 1951 expedition affected their later lives, and those replies, in Chapter 12, "Aftermath," provide interesting reading. Most never returned to Spitsbergen, although Colin's experience vaulted him into a life of polar expeditions and exploration as a glaciologist and geophysicist, consisting of more than 20 expeditions over a period of 50 years, as well as senior academic positions at major universities. The book is a tribute to his tenacity and persistence that this important documentary has become available for the public and is a treasure for anyone interested in how expeditions can be put together on a shoestring, as well as the means by which differing personalities can work together under trying conditions and stay friends for a lifetime. I urge you to read this book in order to gain an insight into how anything can be accomplished if you just try. It is also obvious that a sense of humor is a key to success, and nothing in life should be taken too seriously. A bonus to the book is the oil painting of the author by his wife, shown in color on the inside of the dust cover. As a tribute to Colin's ability as a mentor and advisor, the foreword to the book is authored by Dr. Olav Orheim, one of Colin's Ph.D. degree students in glaciology when both were at The Ohio State University. ❑

Rockets Over Alaska: The Genesis of Poker Flat

By Neil Davis

Ester AK: Alaska-Yukon Press, 2006. ISBN 0-9778141-0-6. xii + 244 pp. Chronology, Illus., Epilogue, Appendix, Index. Hardbound, U.S. $30.00

Review by Dave Norton. Arctic Editor

As a privileged acquaintance of accomplished scientists and scholars, I am intrigued by how such people manage to advance the general understanding of how our world works. Never mind that so far no common pattern of thinking about the world has emerged to help me adopt any sort of "Scientific Method" discussed in introductory textbooks. The late Stephen Jay Gould denied that any universal recipe for analytical thinking has ever existed. My sampling of evidence from contributors' inside stories embraced this account of the birth and early operation of the world's only university rocket range. This chronicle qualifies as a gem among researchers' disclosures of secrets of success.

Rockets over Alaska shows that founders' location of the University of Alaska's first campus in 1917 near the gold mining and agricultural community of Fairbanks (map, p. 69) destined it to have a nearly ideal window on aurora borealis, or northern lights. By similar chance, maturing technological tools available to geophysicists happened to favour mounting a major effort to understand the mechanisms behind auroral phenomena at the time of the International Geophysical Year (IGY—1957-58). Thus, naturally, key observational and theoretical efforts were blended at the University of Alaska's Geophysical Institute during IGY. A crop of graduate students and technicians gained degrees and experience at the Geophysical Institute during IGY. They sharpened the Institute's appetites to operate at the cutting edge of further upper atmospheric studies. Neil Davis, one such graduate, begins his account in the midst of his own academic diaspora: After receiving his doctorate in 1961 from the University of Alaska, Davis was figuratively banished, so he could gain advanced academic and practical experience from other institutions in other parts of the world (p. 5). After such traditional academic banishments, a small fraction of alumni may be invited to return to the institution where they earned their degrees.

Although he had dabbled in amateur rocketry as a graduate student (p. 7-8), Davis' real interests lay in the science and the payloads with which scientists could study Earth's ionosphere. Newly minted Dr. Davis happened to fit in with National Aeronautics and Space Agency (NASA) needs as a then six-year-old agency to form a new sub-orbital research program. The problem for both Davis and the University's Geophysical Institute was how urgently rocketry and payload technology in support of research were maturing during the decade following IGY. By the mid-1960s, pressure mounted for Davis to return from his fellowship at NASA, to become assistant director of the Geophysical Institute (p. 51). The author, who grew up on a homestead in Alaska, was having too much globe-trotting fun to be in a hurry to return to an administrative position. "Fun" consisted of equal parts of adventurous scientific teamwork and of learning how to negotiate bureaucratic hurdles in federal agencies and private corporations (e.g., "Parking Problems," p. 25-26). Readers encounter a mixture of self-deprecating stories about how the author got into and out of near disasters, his surprise at succeeding with unexpected opportunities, and above all how devilishly entertaining he found his adventures with NASA. After participating in successful ship-

board rocket launches in the Pacific, Davis found himself testing a new TV system with highly sensitive film to detect changes in auroral displays brought about by experimental payload releases in the aurora. NASA's high-latitude rocket range for auroral studies was then located at Ft. Churchill, Manitoba. When their sensitive camera proved vulnerable to malfunction at Churchill's October temperatures, the team promptly visited the Churchill dump, where they helped themselves to all the discarded materials the dump connoisseurs needed to fashion a heated and insulated box for the instrument (p. 54).

At length, the Geophysical Institute's director lured Neil Davis back to Fairbanks in mid-1965. The new position allowed him to continue his scientific work, burdened by only minimal administrative duties (p. 60-61). With his change of status, it was impossible for this product of NASA postdoctoral adventures to keep his mind off the notion of constructing a rocket range handy to Fairbanks for auroral and other upper atmospheric studies. A proposal to national agencies ensued. Poker Flat Research Range existed as a plan and a leased neck of land within an oxbow of the Chatanika River as of 1966 (p. 77). For a couple of years, the proposal to construct and operate the Range appeared to languish, but momentous events and progress nevertheless continued. In August 1967, a 100-year flood struck Interior Alaska, inundating the low-lying riverbank land on which Neil Davis had originally proposed to site the Range's launch pads (p. 65-78). The pads were shifted to higher ground on the other side of the highway (p. 110). In January 1968, within five days of the announced discovery of commercially significant quantities of oil and gas at Prudhoe Bay, Alaska, a B-52 bomber carrying nuclear bombs crashed into the Ocean near Thule Air Force Base, Greenland. That accident led Denmark to prohibit a number of planned U.S. research programs from being carried out in Greenland. Suddenly, with Churchill's rocket range overscheduled, Defense Department and NASA payload programs became eager to develop a new high-latitude launch facility (p. 91-93). Meanwhile, electrical engineers had improved the camera systems used to document auroral probes (p. 78).

By mid-1968, Davis had wangled promises of funding and verbal authorizations to proceed with range construction from several agencies. At one point, the director of the Institute became alarmed that the project was promised some $300,000 by granting agencies but lacked a single written authorization to spend (p. 103). The first Poker Flat launch was scheduled for early March 1969 (p. 110) so the short Alaska summer construction season of 1968 was especially frenetic. To save on overhead expenses, Geophysical Institute employees and graduate students were pressed into service when the project could not afford contractors. The A-frame building to cover the Universal launcher and rocket up to a few moments before a launch (so that rocket motors could be kept warm) illustrates the improbable combinations of rocket technology and Alaskan ingenuity at recycling that contributed to getting the job done. Its walls rested on I-beams salvaged from a nearby bridge that collapsed during the 1967 flood, and those in turn rested on mining rail cars salvaged from a coal mine. Those cars rolled on sets of tracks made up of rails salvaged from the Fairbanks Exploration Company's abandoned gold dredge operation a mile from the range, pulled by a large winch that one of the construction foremen had bargained to buy used for $100 (p. 112-120). Range pioneers managed to build a heated ready room equipped with a flush toilet despite various federal sponsors' refusal to pay for its construction (p. 121-122). Another homespun victory was to synchronize early IBM 360 computers over a wide spatial array of phone-connected observers, to enable them synchronously to aim cameras in corrected directions after a launch (p. 109).

Improbable adventures and flirtations with misfortune continued after Neil Davis' replacement by a full-time Range Director in 1972, but probably did so at a declining level of derring-do from the first years of pioneering. By 2005, over 300 rockets had been launched from Poker Flat. This book's narrative concludes with a series of personal recollections and humorous salutes to the individual pioneers, heroes and heroines of the Poker Flat rocketry enterprise who worked so well as a team (Chapter 14).

Curiously, someone at the University of Alaska Press decided against publishing this chronicle, despite the Range's undeniable prominence among the University's 20th century achievements, and despite acclaim by manuscript reviewers. This alternative publisher furnishes us documentary evidence that essential ingredients to the author's and his colleagues' careers of scientific accomplishment included teamwork, an infectious sense of humor, and a determination that research should be fun. ❑

The Lost Men: The Harrowing Saga of Shackleton's Ross Sea Party

By Kelly Tyler-Lewis

Viking, $25.95

Review by Robert Speer

Everyone who loves a good adventure yarn is familiar with Sir Ernest Shackleton and his epic 1914–16 expedition and self-rescue after his ship, the *Endurance*, became ice-locked in the Weddell Sea. Led by Caroline Alexander's best seller, there have been books, films, Nova episodes, you name it. And for good reason: It's one of the greatest survival tales of all time.

As a result of all this Shackleton mania, another amazing tale, that of his support crew on the other side of Antarctica, the Ross Sea party, hasn't received its due—until now. With her exhaustively researched and vividly written first book, English historian Kelly Tyler-Lewis has righted the record and told a story that, in its own way, is just as astonishing as Shackleton's.

Shackleton's subsequently aborted goal was to make the first transcontinental crossing of Antarctica. To do so, he needed to cache the second half of his route with provisions. He purchased an old whaler, the *Aurora*, and hired Scotsman Aeneas Mackintosh to sail it from the Australian side of the continent (opposite his approach from the South American side), then place supplies for them along a 360-mile route across a forbidding ice shelf leading to the South Pole.

Almost nothing went right. The *Aurora* needed a last-minute refitting, causing it to arrive too late in the season at the Ross Sea; the provisioning was inadequate; most of the sled dogs quickly died; and the mercurial Mackintosh lacked experience on the ice. A clash between him and Ernest Joyce, an experienced polar seaman, divided the crew's loyalties. Then, worst of all, the *Aurora* became caught in the ice pack and drifted out to sea, stranding Mackintosh and nine men on the shore.

They could have holed up and waited for help to come, but they were determined to deposit the caches, believing the Shackleton party was depending on them. So they sledged 1,700 miles of hunger, frostbite, snow blindness, raging blizzards, and debilitating scurvy. They spent two years on the ice before being rescued, and three of them died, while Shackleton, under similar circumstances, didn't lose a man. Unlike Shackleton, however, they were successful in their mission. The irony, of course, was that their success was for naught. ❑

A Visitor's Guide to the Falkland Islands, 2nd edition

by Debbie Summers

Falkland Conservation, 2005
ISBN: 0-9538-3715-7

A Visitor's Guide to South Georgia

by Sally Poncet and Kim Crosbie

Wildguides Ltd, 2005
ISBN: 1-903657-08-3

Review by Charles H. Lagerbom

Someone planning a visit to the Falkland Islands in the near future is in luck with the publication of the second edition of Debbie Summers' *A Visitor's Guide to the Falkland Islands* from Falklands Conservation, 2005. First published in 2001, this handy spiral-bound book by a native Falkland Islander fits easily into your jacket or the pocket of a rucksack. It is also chock-full of maps, history, photographs and information about the islands. Each site covered in the guide has a box listing features, a detailed map and useful pointers to keep in mind when visiting. There are also sections by Tony Chater on photography and expedition leader Allan White. A glossary of terms and acronyms is included in the back, as well as useful addresses and a checklist of the fauna and flora mentioned in the text, all of which adds up to an excellent "hands-on" guide to bring along when you visit these remarkable islands.

This same format also works well with Sally Poncet and Kim Crosbie's *A Visitor's Guide to South Georgia*, another 2005 Wild Guides publication. Full of maps, history and beautiful photographs, this guide highlights sites from Elsehul and Prion Island to Dryglaski Fjord and King Haakon Bay, all with lists of features and helpful pointers. There is also a checklist of the fauna and flora described as well as a bird breeding calendar. Also in the back is a pretty good bibliography and a list of useful addresses and web sites. This spiral-bound book is a handy size and can easily sit flat, freeing one's hands for the camera or binoculars.

For further information contact: Brian Clews at sales@Wildguides.co.uk ❑

One Long-Awaited Treatise: *The Nature Of Paleolithic Art*

by R. Dale Guthrie

Chicago IL: University of Chicago Press. 2005. ISBN 0-226-31126-0. xii + 507 p. 3-colour illus., appendices, bib., index. Hardbound US$45.00.

Review by Dave Norton, Arctic Editor

Should you believe scientific discourse to be beyond your comprehension, try approaching this book as one of the great "whodunits" of recent decades. The mystery? Beginning about 40,000 years ago and ending rather abruptly in the interval of 12,000 to 10,000 years ago, our human ancestors across Europe and Asia developed and practised graphic arts markedly different in form and subject matter from either earlier or later anthropological remains. Who, exactly, were these artists? What was the significance or purpose of their carvings, sculptures, tool adornments and their thousands of drawings and engravings on limestone walls?

One discovery just northeast of Fairbanks, Alaska, contributed to genesis of this book. In 1979, a gold miner uncovered the frozen remains of a Pleistocene bison killed by lions 360 centuries ago. From laying foundations for a multidisciplinary team of analysts' work on that bison, palaeontologist Dale Guthrie and his wife, Mary Lee, grasped the far-reaching implications of this single exquisitely preserved specimen of a large mammal now extinct. They changed plans for their upcoming sabbatical in Europe and Russia, to allow them to examine Ice Age artists' images of this and other species of Pleistocene fauna across Eurasia. For most of 300 centuries, and across a wide geographic expanse, perhaps a thousand generations of pre-literate people had observed and painted or engraved images of Bison priscus from life as a result of stalking, observing, and hunting them. This earlier form of bison, like the woolly mammoth, ranged across a broad, generally treeless grassland stretching from modern Spain and France south of continental ice sheets, across Asia to the Bering land bridge into unglaciated Alaska and northwestern Canada (maps, pp. 18-19). When Guthrie's definitive work on the bison specimen (nicknamed "Blue Babe") and other frozen fauna of the "Mammoth Steppe" was published (Guthrie, 1990) he had already spent a decade formulating fundamental disagreements with the generally accepted interpretations of Palaeolithic ("cave") art. Too many things were wrong with the idea that this fossil art was produced by adult shamans leading young initiates on regular "vision quests" (text box, p. 36).

A quarter century after the bison discovery, Guthrie has now published this "whodunit" as a multi-faceted challenge to existing theories and assumptions about Palaeolithic art and artists. Painstaking thoroughness explains the decade and a half that it has been in preparation. If that were not enough reason, Guthrie is also his book's main illustrator: thousands of his renditions of original fossil art, plus his own artistic interpretation of the same subjects adorn all but a few of the book's many pages of text.

This work will spur scepticism. First, isn't it presumptuous for a North American scholar to reanalyse the sources and functions of Palaeolithic art? After all, North America constituted the one major segment of the circumarctic Mammoth Steppe from which humans—hence artists—were absent when most Palaeolithic images were created. To this question, the author can legitimately claim an all-inclusive observational palette. Guthrie's analytic qualifications include wide-ranging experience as a biologist, an artist in his own right and as a hunter. Moreover, his palette is free of the preconceptions that others might have inherited from any of several Eurasian scholarly traditions. Guthrie diplomatically comments that in Europe, "studies...of history and prehistory have been highly partitioned," such that although Palaeolithic art has proven to be an enormous treasure and archive for natural history, "artistic creations" in Europe have been considered outside the disciplines of natural history until recently (p. 5). Thus, a North American polymath was arguably the ideal disciplinary outsider and generalist to look afresh at one of the world's extraordinary bodies of ancient art.

Another sceptical question: Should *The Polar Times* devote book review space to this treatise, largely focused on creativity of peoples who lived at latitudes south of the Arctic Circle? Paris, Lascaux, Altamira and Hohlenstein were fiercely seasonal periglacial environments during the last glacial maximum of the Pleistocene. Those latitudes were inhabited by some of the biota we find today only in the Arctic. When Palaeolithic art flourished, Scandinavia, parts of western Russia, and eastern Canada lay under massive ice sheets. Faunal and biotic community distortion worked in reverse, too. In Palaeolithic imagery, Arctic reindeer and Pleistocene bison mingle with animals ranging northward from centres of adaptive radiation in African savannah, such as our own species, lions and woolly rhinoceros. The fossil record confirms that Pleistocene artists were not fantasising: these animals mingled in life on the grass-dominated periglacial steppe. From his earliest encounters with Palaeolithic art, Guthrie's respect for the artists' observational skills has steadily grown.

The style of this book could catch you by surprise. Don't make the mistake that I made of expecting a coffee table volume, styled after a museum exhibit catalogue. Guthrie does not skimp on analytic text in favour of spectacular colour imagery. Rather, this volume is limited to black and sepia inks on white paper. Instead of a collection of photographs of Palaeolithic art, expect the single artist's elegant interpretations throughout —similar to the best examples of natural history field guides in the tradition of Roger Tory Peterson and David Sibley. And yet this is not a field guide either: don't expect encyclopaedic illustrations of all known horses to follow those of all woolly mammoths. Explicit images of humans would be likewise segregated. Text and graphics blend so thoroughly that your eye jumps from narrative to text inset box, to figure, and to figure caption. Illustrations are not numbered, but are associated with the narrative closely enough that you learn where to look for them as support for what you read.

Neither coffee table book nor field guide, *The Nature of Paleolithic Art* is a systematic essay relatively free of the scientific jargon of formal dissertations. Guthrie's discourse recalls an earlier era of scholarly exposition. Scientists nowadays communicate primarily with other scientists, yet their freeze-dried prose often bewilders specialists in any narrow field outside that of the authors. In pursuit of de-mystifying such erudite wisdom, many talented authors write about science for lay audiences. What's extraordinary about Guthrie's book is that he marshals his evidence and argues his case before all of us, not just to an audience limited to palaeontologists or artists, Eurasians or anthropologists. This is not a book about scientific exposition; it is the exposition. Charles Darwin presented his theory of natural selection as the mechanism behind the observed fact of organic evolution with his book, *The Origin of Species*, to a similarly inclusive audience in 1859. Ernst Mayr revisited Darwin's published contributions to modern science in 1991, in a book he titled *One Long Argument*, hence my parallel title, "one long-awaited treatise."

Readers are presented many lines of evidence in this "whodunit." First, the nature of the artists: Evidence from physical anthropology tells us that Eurasian Neanderthals were undergoing replacement by Cro-Magnon humans (probably issuing north out of Africa) at the onset of date-able Palaeolithic art some 40,000 years ago (p. 23-24). So the limited creativity of the Neanderthal pre-Homo sapiens inhabitants of the Eurasian limestone provinces (map, p. 34) was giving way to a more imaginative, more playful, and slower-maturing human type, probably indistinguishable from ourselves. As to motives, the fossil art that survives from the 30 millennia that followed reveals more by what it does not include than by what it does. Outside the subjects of hunt-able mammal fauna and selected human forms (with an emphasis on organs related to, or signalling, reproductive capacity) the absence or rarity of many other subjects is remarkable. Images of plants, birds, fish and insects are less frequent than would be expected had late Pleistocene art been produced by all demographic segments of the population with equal rates of preservation. Many human situations are not represented (mothers with infants are almost unknown in surviving images—illus., p. 233) and some parts of human bodies are rarely depicted (faces of men and women are often blank or incomplete in images that nevertheless portray heads, chins and even hair that has been trimmed and styled around featureless faces—illus., p. 316). Although scenes of death and injury to hunters abound in late Pleistocene art, scenes of battle among humans are unknown until the onset of Holocene imagery (p. 418).

Little by little, this treatise hones the author's conclusions. A less thoughtful and cautious work might have exaggerated the predictions of Jean Clottes, one of the book's dust-jacket commentators:

"...Cave art specialists and others will in turn be startled (often) and outraged (sometimes), as well as amused and fascinated by this original, controversial and informative attempt at explaining Paleolithic art and life from the point of view of natural history."

My 'startle' responses were triggered upon learning how much of surviving Palaeolithic art was inspired by suggestive shapes of rocks, or stalactites in caves (e.g., illus., p. 49-50); that many images betray immature attempts at perfecting artistic skills on common subjects (e.g., illus., p. 96; 100-101); and that the ratio of surviving Pleistocene art to what was originally created is so tiny (p. 35-47). Lacking an ideological ox to be gored, I failed to be 'outraged' by any sections of this book, but my 'amusement' ti tre rose, as for example at Guthrie's impatience with scholars who discuss humans as predators, but who lack firsthand experience as hunters (e.g., box, illus., p. 220). In the last analysis, 'fascination' trumps all my other reactions to this book. Even if future analysts conclude that Guthrie got some of the details

wrong, I find it hard to bet against his big picture of Pleistocene hunting societies as the last great forge through which human evolution has passed. That is, as an urbanised, uncomfortably tribe-oriented organism, our species has at best made only a partial transition in the Holocene from our Pleistocene past, when our ancestors lived in small bands pursuing large mammals over the savannahs and steppes of the Eastern Hemisphere. Our modern inability to refrain from warfare demonstrates that the equilibrium between competition and cooperation (p. 256) that worked for small bands of hunters has yet to find some new balance point in the 10,000 years since Palaeolithic art was supplanted. Something in the equation changed when tribes replaced bands, agrarian congregations grew, horses were domesticated instead of being hunted, language families spread and wealth could be accumulated and fought over.

Likewise, we have been left variously ill at ease with the particular nature-nurture mix of cues inherited from Pleistocene natural selection on how to choose mates and contribute high-quality progeny to succeeding generations. The distinction between Philos (bonding) and Eros (lust) helps to frame the discussion of proximate and ultimate signals within the natural history of human heterosexual attraction (pp. 315-320). The preponderance of human female forms depicted in Palaeolithic art is one of the lines of evidence used to argue that most surviving art was created by males, specifically pre-adolescent and adolescent males. Illustrations by accomplished adult artists in the Lascaux Caves are an exception to the generalisation that most surviving art of the era was the work of children (box, p. 39). The generalisation fits with Guthrie's profile of the human condition in late Pleistocene Eurasia. Childhood was both qualitatively and quantitatively important to life in small bands of 20-40 persons, given that adults became wise elders by 35 years of age (illus., p. 443). Thus, in Guthrie's construct, a great share of surviving Pleistocene art was committed by male children. Boys were striving toward several competencies at once: hunting prowess, recognition of appropriate mating and sexual cues, and proficiency in art and tool making. Decorated limestone walls and shaft-straightening tools were Pleistocene youngsters' combined equivalents of today's school blackboards, trade and girlie magazines and rarely visited secret clubhouse hideaways.

This intimate scrutiny of humanity's coming of age deserves the wide reading and discussion for which it is designed. Those of us attracted to circumpolar and circumarctic topics will naturally be asked to comment on the degree to which important finishing touches on our human species took place at the highest latitudes that humans could inhabit during the Pleistocene. Reactions by scholars to Guthrie's propositions in the coming few years will be interesting, even entertaining. Meantime, imagine the lively dinnertime or cocktail hour conversations you can stimulate, armed with provocative ideas advanced in this book. ❑

Reference: Guthrie, R.D. 1990. Frozen fauna of the Mammoth Steppe: the story of Blue Babe. Chicago: University of Chicago Press.

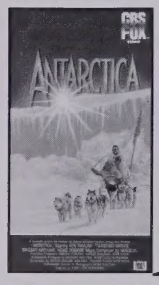
Eight Below vs Antarctica

Review by Billy-Ace Baker

Eight Below

Starring Paul Walker, Jason Biggs, Moon Bloodgood
Walt Disney Pictures; Rated PG-13
120 minutes; Released in 2006

Antarctica *(Nankyoku Monogatari)*



Starring Ken Takaura, Tsunehiko Watase, Masako Natsuke
Twentieth Century Fox; Rated G
112 minutes; Released in 1984

Antarctica is a true story from a time when machines and technology were far less advanced and exploring Antarctica was far more difficult. It is a story about the first Japanese Antarctic Research Expedition (JARE) of 1957, consisting of 11 men and 17 dogs.

Eight Below is based on the Japanese film and takes place in 1993. The Madrid Protocol, written in 1991, banned dogs effective April 1994. In fact, the U.S. Antarctic Program has not had any working dogs since the IGY.

Following the success of *March of the Penguins* and now *Eight Below*, Antarctica is suddenly sizzling hot in the movie industry. So hot that prior to the release of *Eight Below*, VHS copies of *Antarctica* could be purchased on the Internet for less than $20, while several weeks later, copies were selling for $80.

The movies are similar in more ways than many movie reviewers would have you believe. Both films open with seemingly endless views of expansive frozen landscapes. The filmmakers did a great job, as these shots reveal the breathtaking beauty of Antarctica. However, parts of *Eight Below* were filmed on location in Canada, Greenland, and Norway. If the Japanese version was also filmed on location, I missed it when the credits rolled. However, the credits state that New Zealand's Scott Base provided support for the filmmaking.

Although I enjoyed both movies, *Antarctica* is the better movie, despite a lot of melodrama. The soundtrack by Vangelis is probably better known than the movie itself.

The dogs in each film get the best of both worlds—they adapt to the wild, yet their domesticated side knows how to make use of an abandoned weather station as a source of tasty snacks: cans of Spam in *Eight Below*, and cached seal meat in *Antarctica*. The real point of the story is how primal these creatures remain. Even after they've been trained and domesticated, they are just one catastrophe, or plane ride, away from the call of the wild.

In *Antarctica*, one dog finds shelter in a whale carcass that had previously been used as a refuge by JARE personnel during a blizzard. In *Eight Below*, the dogs find a leopard seal living inside a dead killer whale. The leopard seal attacks the dogs, but it looks unrealistically large compared to the size of the dogs. My first thought was that the seal was computer generated. However, the credits at the end of the movie named the "leopard seal puppeteers." A scene in the Japanese version also shows a fight between the dogs and a leopard seal. The seal looked real, but the credits in *Antarctica* claimed that no animals were harmed making of the film.

I have no idea if dogs can actually pluck birds from the sky, but in both movies they do. I don't know what bird species was shown in *Eight Below*, but in *Antarctica* they're skuas. In *Eight Below*, the dogs howl with delight at the sight of the aurora borealis, but in *Antarctica*, they don't understand it, and at least one is terrified by the eerie lights.

There are people in both movies, too. In *Eight Below*, the dog handler takes a scientist on a dangerous hunt for a meteorite from the planet Mercury. Bad weather causes them to hurry back, and the entire outpost is evacuated in advance of a catastrophic storm. The hero, the scientist, the rock, and the dogs make it back to the main camp—barely. In *Antarctica*, a group of meteorologists are returning from a remote weather station to their main base. They get lost in a white-out coming back, so they let the dogs Taro and Jiro loose, hoping that the dogs will find their way back to the station and lead a search party to them. They do.

In both movies, the dogs are left behind when the people are forced to evacuate due to climatic conditions.

Both films alternate scenes between the dogs' efforts to survive and the humans' efforts to return to get them—or to make peace with their consciences. In *Eight Below*, subtitles periodically note how long the dogs have been left alone, but that doesn't enhance the sense of suspense. In *Antarctica*, subtitles note the name or names, and ages, of the dogs as they perish.

The dog handler in *Eight Below* never stops thinking about the dogs, but there's not much he can do. He visits the scientist whose research financed the meteorite-search dogsled expedition, he hangs out at his mobile home on a scenic Oregon coast, and he pursues a reawakening love affair with the pilot who ferried them to and from the station. In *Antarctica*, the dog handler also thinks constantly of the dogs, he visits the scientist who was the JARE team leader, and he decides to take the two puppies he was able to evacuate with him to the families that supplied the expedition's dogs. As time passes, the dog handlers in both movies sink deeper and deeper into gloomy introspection.

Six of the main characters in *Eight Below* are Siberian huskies and two are Alaskan malamutes. Six of the eight dogs live through their ordeal. In *Antarctica*, with a total of 17 Sakhalin huskies, besides the two evacuated pups, just two dogs—Taro and Jiro—survive.

If you are looking for reality, you won't find it in *Eight Below*. You may wonder, as winter sets in, When will it get dark? Why don't the surviving dogs eat the two that died? Why didn't the birds leave? Those are just a few of the many unanswered questions. Another mystery: Although it appeared that, because of the "strongest storm in 25 years," no one wintered at the American or the Italian bases, yet the flag was still flying when the characters returned to the ice and flew to the Italian base to "borrow" a Snowcat.

I also wonder where *Eight Below*'s props came from. The Seabee coffee mug in the radio shack and the National Science Foundation patches on the red parkas appeared to have the word "Canada" on them, not the USA. The patch also appears to depict a landmass, but if it's the Antarctic continent, the peninsula's missing. Who was the technical advisor? ❑

at midnight. Indeed, it is constant as stated by Steger. Setting the clock at noon on the meridian starting point enables an easy check along the way and tells if one is east or west of the desired longitude and, in any case, the direction of true north.

Peary set out onto the polar sea ice with six expedition members, 21 Eskimos, and the best 140 of more than 200 dogs, with 19 sleds carrying loads of 450 to 500 pounds. He formed them into six teams (divisions), and they broke the trail, established igloo camps and carried out a system of one-way relays to move supplies forward, sending the injured and poorer performers back to land, one team at a time along the way to 88°N, while Peary saved his own energy for the final dash. By 88°N, Peary had the choice of the four most motivated Eskimos, the best 40 dogs and five sleds. (Bartlett had established their position at 87°47'N; 133 miles left to go.) There Peary had to choose between his long-time companion of all his Arctic expeditions, Matthew Henson, or his ship's captain, Robert Bartlett, who at that time was a British citizen. Henson knew the Eskimo language best, had rapport with them and was arguably the better dogsled driver of the two.

All three expeditions experienced improving ice conditions beyond the wide shear zone that separates the drifting polar pack ice from the shore-fast ice at and beyond Ellesmere Island's relatively shallow continental shelf which extends out about 50 miles. Both Peary and Steger encountered the so-called "big lead" of open water at approximately 84°N, while Avery apparently did not.

Steger's expedition set out with seven men and a woman, five large sleds and 49 dogs with average loads of 1200 pounds, vs. Peary's nominal 450 pounds. During their first 24 days, they had to relay partial loads, going back and forward, thus tripling their travel distance until they got beyond the rough ice of the shear zone. Steger's party encountered two major storms with very strong winds at about 84°N and at 85°N, which caused slight northeasterly drift of the sea ice. They were delayed three times while they sent out two men and 28 dogs by aircraft. This left them with three shortened sleds, 21 dogs and five persons on their 36th day at 86°10'N. They, too, enjoyed better ice north of 86°N. (In this stretch, they also met solo skier Jean-Louis Etienne who also made it to the pole.) Between 88°N and 89°N, they had a problem with their sextant and finally corrected it at 89°30'N. Moisture had gotten into its internal mirrors and frozen. This caused the loss of one day's travel northward and a detour during their final dash from 88°N. Otherwise as above, they would have matched or even exceeded Peary's final five-day dash to the pole. Like Peary, they achieved the pole solely by sextant and magnetic compass, and their position was within a few hundred yards of the pole by GPS, with six of eight persons and 20 of 49 dogs remaining. They were picked up at the pole by aircraft.

Avery's expedition in 2005 set out on March 20 with five persons (one, a woman of Peary's age) with two sleds like Peary's design and 16 dogs, leaving 21 days later in the season than Peary. Based on the limited available details, they apparently did not encounter the so-called "big lead" in the shear zone but did encounter 40 to 50 open leads en route and strong winds that caused them to drift south on their 34th day of 37. As above, Avery wrote that, lacking this happening, they would have matched or exceeded Peary's final dash speeds. They did match Peary's total of 37 days to the pole, even beating him by a few hours.

Polar Sea Currents:

Peary's and Avery's routes to the pole were along the 70°W meridian from Cape Columbia and Steger's from adjacent Ward Hunt Island at 75°W, essentially the same distance to the pole. This is mostly within a zone of sea current null, wherein the currents have little effect until near to the North Pole. The drift of the pack ice is affected more by strong winds; and as we have seen, the magnetic compass variation is approximately constant all the way to the Pole.

Water flows north from the Pacific Ocean into the polar sea where its multiple directions are affected by the surrounding land configurations, and finally outward into the Atlantic Ocean. The primary outflow is via the east side of Greenland, with lesser flows southward through the Canadian Arctic islands to the west of Ellesmere island and through the narrow channel between Ellesmere Island and northwest Greenland, with gyral currents flowing in different directions. The distinctive clockwise Beaufort Gyral is well to the west of this 70° or 75°W longitude route with its drift rate of one to three miles per day. On the east side of this route to the pole, the currents vary in direction as one goes northward—first southeastward toward northwest Greenland's Smith Sound, then into a lesser clockwise gyre's westward flow, then northward, then eastward, then west again, and finally east again as one reaches the transpolar stream flowing to the Atlantic via the east coast of Greenland.

RECAP (distance 413 miles)

PEARY

- 37 days (Feb. 28 to April 6, 1909)—Set out with a total company of 28 persons, 19 sleds and 140 dogs, with sled loads of 450–500 pounds
- Final Dash (from 88°–90°N)—Six men, five sleds and best 40 dogs

STEGER

- 54 days (March 8 to May 1, 1986)—Set out with seven men and one woman, five sleds and 49 dogs, with sled loads of 1,200 pounds
- Reached pole with six persons, two sleds and 20 dogs. Achieved close match to Peary's final dash

AVERY

- 37 days (March 20 to April 27, 2005)—Set out with four men, one woman, two sleds, 16 dogs. Sled loads same as Peary and close match to Peary's final dash. ❑

The net effect of these multi directional and frequently opposing currents was illustrated by the track line of Steger's expedition that was plotted externally by GPS. Their actual track was essentially a straight line from land (until they had problems with their sextant) and thence to within less than one mile west of the pole. Two minor deflections eastward were caused by very strong winds at about 84°N and 85°N, and one westward at 89°30'N to avoid bad ice and open water near the pole late in the season.

Navigation

As one approaches the North Pole (beyond 88°N), longitudes become increasingly meaningless, and the Sun's elevation approaches being constant except for its daily rise. Thus, one has to depend on the compass heading in order to maintain direction north and distance by "dead reckoning." Peary made his initial polar sextant observation to determine his latitude just after noon on April 6 and then did a series of observations; 10 miles further, then back, then from 8 miles at a right angle and then back again, taking sights at midnight, then at 6 a.m., one in between and at noon again on April 7. This, as a sailor knows, amounted to a "four-line running fix" spanning 12 hours. Per his calculations, the pole was somewhere within his "fix," or close enough. Steger's observations were similar and put him within less than one mile from the pole by GPS. Peary's primary concern at that point, with no aircraft to take him home, was their safe return to land. ❑

Studies Portray Arctic as Sultry in Distant Past

Heat-Trapping Gases May Be More Powerful Than Scientists Thought

PHOTO BY MARTIN JAKOBSSON

The ship Vidar Viking had to remain stationary for days at a time amid drifting sea ice near the North Pole.

New York Times, **1 June 2006, by Andrew C. Revkin**—The first detailed analysis of an extraordinary climatic and biological record from the seabed near the North Pole shows that 55 million years ago the Arctic Ocean was much warmer than scientists imagined—a Floridian year-round average of 74 degrees Fahrenheit.

The findings, published today in three papers in the journal *Nature*, fill in a blank spot in scientists' understanding of climate history. And while they show that much remains to be learned about climate change, they suggest that scientists have greatly underestimated the power of heat-trapping gases to warm the Arctic.

Previous computer simulations, done without the benefit of seabed sampling, did not suggest an ancient Arctic that was nearly so warm, the authors said. So the simulations must have missed elements that lead to greater warming.

"Something extra happens when you push the world into a warmer world, and we just don't understand what it is," said one lead author, Henk Brinkhuis, an expert on ancient Arctic ecology at the University of Utrecht in the Netherlands.

The studies draw on the work of a pioneering 2004 expedition that defied the Arctic Ocean ice and pulled the first significant samples from the ancient layered seabed 150 miles from the North Pole: 1,400 feet of slender shafts of muck, ancient organisms and rock representing a climate history that dates back 56 million years.

While there is ample fossil evidence around the edges of the Arctic Ocean showing great past swings in climate, until now the sediment samples from the undersea depths had gone back less than 400,000 years.

The new analysis confirms that the Arctic Ocean warmed remarkably 55 million years ago, which is when many scientists say that the extraordinary planetwide warm-up called the Paleocene Eocene Thermal Maximum must have been caused by an enormous outburst of heat-trapping, or greenhouse, gases like methane and carbon dioxide. But no one has found a clear cause for the gas discharge. Almost all climate experts agree that the present-day gas buildup is predominantly a result of emissions from smokestacks, tailpipes and burning forests.

The samples also chronicle the subsequent cooling, with many ups and downs, that the researchers say began about 45 million years ago and led to the cycles of ice ages and brief warm spells of the last several million years.

Experts not connected with the studies say they support the idea that heat-trapping gases—not slight variations in Earth's orbit—largely determine warming and cooling.

"The new research provides additional important evidence that greenhouse-gas changes controlled much of climate history, which strengthens the argument that greenhouse-gas changes are likely to control much of the climate future," said one such expert, Richard B. Alley, a geoscientist at Pennsylvania State University.

The $12.5 million Arctic Coring Expedition, run by a consortium called the International Ocean Drilling Program, was the first to drill deep into the layers of sediment deposited over millions of years in the Arctic. The samples were gathered late in the summer of 2004 as two icebreakers shattered huge drifting floes so that a third ship could hold its position and bore for core samples.

Estimates of the prevailing temperatures in the different eras represented by the sediments were made in part by tracking the comings and goings of certain algae called dinoflagellates that typically indicate subtropical or tropical conditions.

Because the samples lacked remains of shell-bearing plankton that are usually relied on to provide temperature records, the researchers used a newer method for approximating past temperatures: gauging changes in the chemical composition of the remains of a primitive phylum of microbes called Crenarchaeota.

Some scientists familiar with the research said that while there were still questions about the precision of this method at temperatures like those in the ancient Arctic Ocean, it was clear that the area was warm.

The temperatures recorded in the samples, right through the peak of warming 55 million years ago, were consistently about 18 degrees higher than those projected by computer models trying to "backcast" what the Arctic was like at the time, according to one of the papers.

Another significant discovery came in layers from 49 million years ago, where conditions

suddenly fostered the summertime growth of vast mats of an ancient cousin of the Azolla duckweed that now cloaks suburban ponds. The researchers propose that this occurred when straits closed between the Arctic Ocean and the Pacific and Atlantic Oceans.

The flow of water from precipitation and rivers created a great pool of fresh water, but about 800,000 years after the blossoming of duckweed began, it ended with a sudden warming of a few additional degrees.

The researchers suggest that this signaled when shifting land formations reconnected the Arctic with the Atlantic, allowing salty, warmer water to flow in, killing off the weed.

The researchers said the sediments held hints that Earth's long slide to colder conditions, and the recent cycle of ice ages and brief thaws, began quite soon after the hothouse conditions 50 million years ago. A centerpiece of their argument is a single pebble, about the size of a chickpea, found in a layer created 45 million years ago.

The stone could have been deposited on the raised undersea ridge only if it had been carried overhead in ice, said Kathryn Moran, a chief scientist on the drilling project, who teaches at the University of Rhode Island.

The stone was probably embedded in an iceberg or perhaps a plate of sea ice that tore free from a gravelly shore. It sank as the ice melted or broke apart, Dr. Moran proposed. Such "dropstones" have long been used to date when an oceanic region has been ice covered or ice free.

The amount of ice-carried debris in the sediment layers began to increase about 14 million years ago, the scientists said. That is also about when the great ice sheet that now weighs down eastern Antarctica originated, Dr. Moran noted. In general, the results from the Arctic drilling project suggest that the cooling and ice buildup at both poles happened in relative lockstep.

This simultaneity tends to support the idea that the cooling was caused by a drop in concentrations of carbon dioxide and other heat-trapping gases, which mix uniformly in the global atmosphere, said Dr. Moran and other members of the team.

Julie Brigham-Grette of the University of Massachusetts, an expert in past Arctic climates who was not connected with the new studies, cautioned against giving too much significance to the single sample, and particularly the single stone from 45 million years ago.

Dr. Brigham-Grette said it was vital to try to mesh the new core results with data gathered around Arctic coasts, where there is plenty of evidence for warm conditions in at least some places as recently as 2.4 million years ago.

Despite her doubts, she said, the project was a stunning achievement.

"It's all very, very exciting to me, because now we can start to rewrite the history of the Arctic," Dr. Brigham-Grette said. "It's like working a giant landscape puzzle of 500 pieces. For a while we only had 100 pieces. Now we have 100 more, and the picture is getting clearer." ❑

Hints of Oil Bonanzas Beneath Arctic Ocean

***New York Times*, 1 June 2006, by Andrew Revkin**—The studies on Arctic sediment that appear today in the journal *Nature* tell a dramatic story of polar warming and cooling over millions of years. But what they tell petroleum geologists may be just as striking.

Some scientists involved in the work said the huge amounts of organic material from dead algae and plants embedded in the ancient sedimentary layers suggested that the center of the Arctic Ocean could hold vast oil deposits.

Several researchers said it would be unfortunate if their climate studies prompted new oil exploration that could liberate more greenhouse gases and further warm the climate.

But one of the authors, Dr. Henk Brinkhuis of the University of Utrecht in the Netherlands, was not shy when he first pointed this out to reporters in 2004. This week, he remained confident the prospect was real.

"The entire Arctic rim is already one big exploration machine," he said. "I was nearly crucified for talking about this by some of the more politically environmentally friendly people out there. But it's a fact."

If the oil exists, it would probably take decades to develop techniques for exploiting such mid-ocean deposits, Dr. Brinkhuis and other scientists said.

Still, a quarter of the world's undiscovered oil and gas resources lie in the Arctic, according to the United States Geological Survey.

Oil companies are clearly interested in what may lie beneath the sea, said Kathryn Moran, professor of ocean engineering at the University of Rhode Island and chief scientist on the drilling project that led to the new studies.

Dr. Moran said she recently gave a talk on the project at the University of Alaska, Fairbanks, and was invited at the last minute by BP, the giant oil company, to stop over in Anchorage to present the talk to 30 petroleum geologists. "They've definitely taken note," Dr. Moran said. ❑

Deserted Iditarod Musher Chases Dogs on Snowmobile

***Columbus Dispatch*, 12 Mar 2006, NIKOLAI, Alaska, by Jeannette J. Lee**—Paul Gebhardt was leading the Iditarod on Tuesday, until his dog team deserted him at the edge of Farewell Lake.

Gebhardt had pulled past four-time winner Doug Swingley to the front of the 81-team field when his sled rammed the last tree before the frozen lake, near the western end of the Alaska Range. His team kept running and snapped the steel-core rope connecting them to the sled.

Gebhardt was left alone in the 1,100-mile race from Anchorage to Nome as his dogs crossed the lake without him. "Their job is to go straight down the trail and that's exactly what they did, just as fast as they could," Gebhardt said.

Gebhardt trudged up the trail for 2 miles toward the eighth checkpoint of Nikolai before hitching a ride with Swingley, who had problems of his own when three dogs fell through some ice.

Swingley took Gebhardt another 2 miles before dropping him with a group of buffalo hunters on snowmobiles. Gebhardt borrowed one and caught up with his team 10 miles from Farewell Lake.

They were still running.

"They were going about 13 to 14 miles an hour, so it was really hard to catch them," said Gebhardt, who finished ninth in last year's Iditarod. "I crowded them on the side of the trail, and they recognized me, and I said 'Whoa,' and they stopped."

Gebhardt tied his team to some trees, retrieved his 100-pound sled and arrived 16th in the Athabascan village of Nikolai with a team of 15 dogs. He took his main leader, Houston, out of the race Monday because of a shoulder injury.

The ordeal cost Gebhardt about three hours and race judges likely will penalize him for using help from the buffalo hunters. Race rules allow mushers to help each other but forbid most other assistance.

Gebhardt managed to take back the lead before three-time winner Jeff King pulled to the front yesterday after leaving the Yukon River town of Galena.

King took the lead when Gebhardt halted his dogs in Galena for a mandatory 24-hour rest. Every other musher in the top half of the 76-team field has taken the daylong break, and many expected to pass Gebhardt in Galena.

Before he left for the Galena checkpoint and his 24-hour rest, Gebhardt was treated to a seven-course meal for being the first musher to arrive in Ruby. ❑

Shivering and Unsung, Scientists Monitor the Arctic Year After Year After Year . . .

The New York Times, 9 May 2006, by **Andrew C. Revkin**—On April 22, two divers from the University of Washington entered a manhole-size opening in the veneer of floating sea ice around the North Pole.

For the fifth year in a row they descended into the blue-green 29-degree water in pursuit of the least glorious, and perhaps most important, facet of earth and ocean science: the collection of basic information on conditions in the same place year after year.

Their task was to retrieve a two-mile-long strand of instruments that for a year had been anchored to the sea floor recording shifting currents, temperatures, salinity, ice thickness and other vital signs. Now, after an acoustic signal released it from the anchor, the strand was bunched in a tangle of floats and Kevlar line under the ice.

The divers are part of a team of nearly two dozen researchers who have been trying to establish the first continuing record of changing ocean conditions near the North Pole.

After this retrieval of a year's worth of data, the team would drop fresh instruments and a new anchor.

Such monitoring, whether in unremarkable places or at the ends of the earth, is unsung and under-financed, but it has resulted in some of the most important discoveries about how the world is changing under the increasingly global influence of humans, many scientists say.

First came revelations about acid rain and the destruction of the ozone layer, with atmospheric monitoring over Antarctica revealing the surprising seasonal "hole" that etched the issue into the public consciousness in the 1980s.

In the same way, quotidian efforts by Charles D. Keeling of the Scripps Institution of Oceanography in San Diego to measure levels of atmospheric carbon dioxide — month after month, year after year, decade after decade — provided the first clear evidence that humans were sharply increasing the concentration of this heat-trapping greenhouse gas.

Ralph Keeling, also at Scripps and the son of Charles Keeling (who died last June), has been trying to sustain his father's carbon dioxide monitoring project in a time of shrinking budgets.

Although such work may seem inconsequential or boring to some outsiders, he said, it has its own special feeling of urgency. "To keep up with the latest pulse of the planet in a warming world is quite exciting, similar to watching the charts of an unstable patient in the emergency room of a hospital," Dr. Keeling said.

Trends in the Arctic so far have been reflected in readings of sea ice thickness and the area it covers, taken by satellites and nuclear submarines.

While satellites have helped track increasing summer retreats of the ice over three decades, they cannot reveal the temperature, salinity and currents of the layered ocean below.

Declassified information collected by submarines has shown that the ice has also been thinning but the data are limited to corridors used in the cold war.

Glaring gaps persist in the data, and as a result scientists have had difficulty putting the recent big changes in air, ice and ocean conditions in the far north into context.

The team that sets up what it calls the North Pole Environmental Observatory each spring is content to add one new data point each year to the big picture, right near the North Pole.

Every such point counts because global-scale puzzles, like determining how accumulating greenhouse gases will alter climate and the oceans, are clearest when assessing the "balance of evidence," not specific findings in one place.

As with a pointillist painting, the picture is revealed only when a large array of dots is regarded as a whole.

The challenge with monitoring the central Arctic Ocean is finding ways to take measurements precisely and consistently in a place where nothing is consistent — where the only unchanging thing is the seabed below the ice, 10 Empire State Buildings deep. But the crunching, shifting frozen surface is in constant flux, often drifting up to 400 yards an hour.

The researchers have endured such conditions since 2000, and the National Science Foundation has agreed to spend more than $1 million a year to support the project through 2008, because the top of the world is an important crossroads for currents and flowing ice that can help reveal bigger patterns as the Arctic Ocean responds to warming.

There is no way, yet, to place instruments on the ice or sea floor that phone home year after year as they might do from a mountaintop or Antarctica. Although that continent has one of the harshest environments on earth, it is — beneath its ice sheets — solid ground so scientists can settle in for the long haul with no need to plunge into frigid depths.

Nonetheless, the North Pole research team has stuck with it. The project was complicated this year by a fresh array of challenges, including unusual warmth and wind, thick fog and fragmented ice.

In past years, the scientists usually enjoyed at least the illusion of being on a solid surface, with their man-made hole being the only open water for more than a thousand yards around.

This time, said James Johnson, a University of Washington engineer who helped design the instrument chains, they were essentially camped on an ice raft not much larger than a football field that was surrounded by patches of black, steaming water. As the days passed, the ice beneath them became progressively laced with disconcerting cracks, Mr. Johnson said.

Independent sea ice experts at the National Snow and Ice Data Center in Boulder, Colo., said the weaker ice, the fog and the open water seen by the team at the North Pole were consistent with their latest measurements of the overall conditions on the Arctic Ocean. They have measured big retreats in the floating ice in recent summers, including a modern record in 2005, and the ice did not rebuild in recent months as it usually does in the deep freeze and long nights of the Arctic winter, said Mark C. Serreze, a senior scientist at the center.

In April the divers, who spent 42 minutes under the ice, faced challenges they had not encountered before. Among other issues, the instruments and attached floats were tangled amid ridges of broken ice under some ice floes.

One diver, James Osse, said his knife, usually a pro forma accessory on these expeditions, suddenly became a vital tool as he was forced to hack through a cat's cradle of line.

"And it was actually sharp enough to cut something, which was surprising but fortunate," he said.

Mr. Osse is an engineer back at the university in Seattle, and there he has devoted much of his time in recent years to devising auto-

CONTINUED AT BOTTOM RIGHT

Not Cold But Dark Frustrates Northern Alaskans Most

Columbus Dispatch, 21 December 2005, BARROW, Alaska, by Rachel D'Oro—Lloyd Leavitt shrugs off the subzero freeze that descends on the Arctic town of Barrow each winter.

The weeks of endless night are what get to him, filling him with insatiable cravings for sleep, carbohydrates and natural light.

"There comes a time when you don't know if it's morning or evening," said Leavitt, who has spent all of his 49 years in the U.S. community with the highest latitude. "You get confused."

Residents eagerly anticipate the passing of the winter solstice, marking the shortest day of the year and the psychological turning point toward spring.

Although winter brings shorter days in other states as well, Alaska represents the national vortex of seasonal blues: The sun won't rise again there for another month.

Therefore, in the largely Inupiat Eskimo town of 4,500, the countdown to daylight starts today.

In the meantime, Leavitt floods his home with rainbow-colored lights.

"They keep the spirits up," he said. Winter is something of a drag for one in five Americans, studies suggest. A smaller fraction—mostly women and young adults—suffer from seasonal affective disorder, a depression stemming from decreased daylight.

About 10 percent of Alaskans suffer the disorder to some degree, according to a 1992 study published in the American Journal of Psychiatry. In Florida, the figure is about 1 percent.

Symptoms include lethargy, a heightened desire for sleep, cravings for carbohydrates, feelings of melancholy, fuzzy thinking and loss of libido or sociability, said Suzanne Womack Strisik, an assistant professor of psychology at the University of Alaska Anchorage.

She's also a practicing psychologist in the state's largest city, where daylight dwindles to 5% hours by the solstice.

"There's a feeling like you should be hibernating, and carbs are very appealing," Strisik said. "It can be really hard to get up even after eight hours of sleep."

Of course, most Alaskans feel the same, regardless of the time of year.

Barbara Bowden, a real-estate broker who has lived in Anchorage more than 50 years, said she never gets the winter blahs.

Only during the first two years there did she feel down, a condition she attributed to feeling homesick for Texarkana, Ark.

Her remedy for coping with winter: stay active.

Until a few years ago, she raced sports cars. Other activities abound in the area: skiing, snowmobiling, ice skating, dog mushing, snowshoe hiking and even running and power walking.

"I tell people coming up here to get up, get out and do something," Bowden said. "Just take advantage of living here."

While some Alaskans defy winter by embracing it, others cope by exposing themselves to bright-light therapy, which doctors say can be highly effective. Others install full-spectrum lighting in their homes and of- ' fices. Some people frequent tanning booths. Some take antidepressants. Some self-medicate with drugs or alcohol. Still others flee the state. Hawaii is the top choice, followed by Mexico and then Las Vegas, said Brenda La Sane, owner of a travel agency in Fairbanks, where the sun will scrape the horizon for three hours and 42 minutes today.

La Sane's clients sometimes run into other Alaskans during winter vacations abroad.

"I try to get away as much as possible," she said after a trip to California. "The darkness gets to" me terribly. I just got back from Anaheim, and it made a huge difference visiting for 10 days. I felt so much more energetic.

"Two days after I got back, I was pushing myself to get out of bed."

Such struggles don't surprise Kelly Rohan, an assistant professor of psychology at the University of Vermont.

The travel strategy, she said, can backfire.

"The problem is re-entry. It's like going to sleep on the Fourth of July and waking up on the 24th of December. That can be very jarring." ❑

CONTINUED FROM BOTTOM LEFT

mated winged probes that he hopes will soon make his Arctic scuba work obsolete.

The probes are meant to glide thousands of feet into the depths and surface, then glide and surface again and again, transmitting data each time they surface, staying at sea for up to seven months.

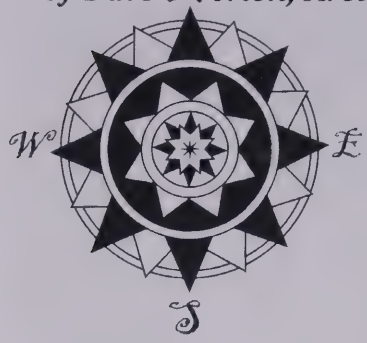
There have been only preliminary tests of such gliders beneath sea ice, where they cannot surface and must keep track of their position using underwater beacons instead of the global positioning system network.

For at least a few more years, then, someone will have to continue diving under the North Pole ice to get the job done.

Andrew C. Revkin's new book, The North Pole Was Here: Puzzles and Perils at the Top of the World, is the first title in a new line of New York Times books for younger readers. For more information, visit **www.nytimes.com/learning/globalwarming**. ❑

Due North

by Dave Norton, Arctic Editor



Of Lifespans and Nostalgia

A university colleague recently displayed on his desk a carton of 5.25-inch computer floppy discs. I admit to a surge of nostalgia upon picking them up and feeling the truly 'floppy' texture of those once-essential accompaniments to the digital revolution. It was the first time in over a decade that I had handled large discs. Is this absurd or what? An antique used to have to be 100 years old, by definition. As some wag once said, "Nostalgia ain't what it used to be."

Come to think of it, the laptop computer at my fingertips as I compose this column will retire from service before the July 2006 issue of *The Polar Times* containing it reaches APS members. Unless recycled or adopted away by a new owner, this laptop could well arouse my nostalgia a few years hence. It is a rarity, for it has served for eight years—an endurance record that its replacement will find hard to match. The retiring laptop has stood up through four generations of operating systems, survived the death of its "motherboard," and is on its third hard drive. Rugged as it has been, I should have retired it two or three years ago, but for a couple of life-prolonging circumstances. One was that the computer industry's technological advances decelerated shortly after this machine represented the "dernier cri" in the last two years of the 20th century. Another was the proliferation of "data sticks" that snap into a universal serial bus to ferry 128, 256, or 512 million bytes of data from one computer to another. Instead of getting roughhoused by Transportation Security Agency personnel at airports every time I traveled by air, my little-laptop-that-could stayed home. Instead of the laptop, I carried a piece of its mind with me in a couple of data sticks to snap into computers at my destination.

Lifespans of computers lead me to ponder lifespans generally. Having attained an age that would have made me a senior citizen in Cromagnon human societies of the Eurasian Pleistocene artists (whose work and demographics are analyzed in the book by Dale Guthrie; see book review insert) before becoming dependent on my first personal computer two decades ago, I'm entitled to feel a bit out of place in this digital era. It continues to astonish me that I have yet to see two or three of the younger staff and faculty who have moved into university offices near mine in recent years in any posture whatsoever other than sitting before their computers, raptly eyeing their monitors. What, I wonder, do these digital whiz kids do? My attention span for what issues from a computer screen is limited, and unlike theirs, my desk is heaped with books, papers, maps, and pictures—more than my share of forest resources consumed.

Having attained an age that would have made me a senior citizen in Cromagnon human societies of the Eurasian Pleistocene artists . . . I'm entitled to feel a bit out of place in this digital era.

Readers may have noticed that *The Polar Times* copes with unevenness in the rates at which new polar book titles appear. The January 2005 issue had to include a four-page addendum to accommodate a burst of reviews. That insert marked the beginning of a run of titles that considered subsistence resource use from several perspectives. *The Whale and the Supercomputer* by Charles Wohlforth and *The Whales They Give Themselves* by Karen Brewster were featured in that issue. Seth Kantner's *Ordinary Wolves* followed in the next issue. These were welcome, even overdue, recognition of how people living from the land in the North represent a special nexus. That nexus is venerable, vulnerable, and cannot be duplicated in Antarctic systems

The Northern Hemisphere books I evaluate in this issue once again treat a theme of how people have lived from the land, or at least from local northern resources. The retrospective, *Rockets Over Alaska* by Neill Davis, salvages stories of making do with resources at hand too, although the resources were industrial products rather than fish or animals or garden produce of the upper Yukon River country. It is sobering to realize that this lighthearted, entertaining account of founding the world's only university-run rocket launching facility might easily have gone unpublished. Had its author been of a less plucky constitution, this thoughtful book could have succumbed to rejection by the first publishing house to which it was offered. I can only imagine that somebody there, for lack of coping with Alaska's unique situations and complications, failed to appreciate the *ad hoc* nature of problem-solving here in the 1960s. Occasionally, the *ad hoc* approach required achievers who best understood the problems to sidestep less informed authorities.

The Nature of Paleolithic Art by Dale Guthrie deals with the very essence of human capacities for living from local resources. By probing deeper in time than the two retrospective books, Guthrie has ventured into the evolution and prehistory of our ancestors beyond the horizons of animal husbandry, agriculture and tribal organization. Although the other book will no doubt cause some readers disagreements and discomforts, Guthrie's exhaustive analysis of the perpetrators of Ice Age art in Eurasia is bound to stir up controversy in learned circles. It promises to be fun to see how that controversy will turn out. In terms of lifespans, however, it is humbling that our ancestral *Homo sapiens* could be satisfied (Guthrie might say "instructed") by a single style of representational imagery over a wide geographic area for 30,000 years. By comparison, I've pushed the keys at my fingertips beyond the expected useful lifespan of the high-tech machine beneath them after only eight years. ❑

HEADS UP!
Mark your calendar for the APS Symposium!
• APRIL 2007 •
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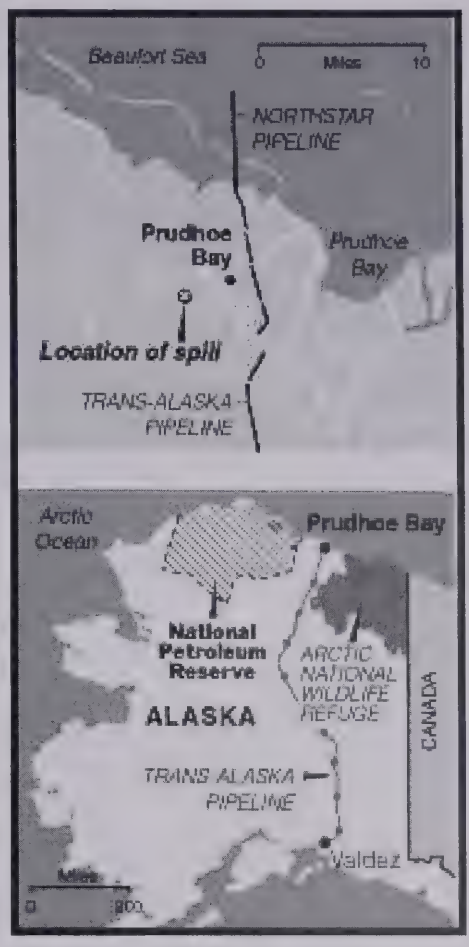
Large Oil Spill in Alaska Went Undetected for Days

BP Exploration (Alaska)

Workers are cleaning up a two-acre site in the Prudhoe Bay area of Alaska.



New York Times, 14 March 2006, WASHINGTON, by Felicity Barringer—The largest oil spill to occur on the tundra of Alaska's North Slope has deposited up to 267,000 gallons of thick crude oil over two acres in the sprawling Prudhoe Bay production facilities, forcing cleanup crews to work in temperatures far below zero to vacuum and dig up the thick mixture of snow and oil.

The spill went undetected for as long as five days before an oilfield worker detected the acrid scent of hydrocarbons while driving through the area on March 2, Maureen Johnson, the senior vice president and manager of the Prudhoe Bay unit for BP, said at a news conference in Anchorage on Tuesday.

At the conference, officials from BP, the company pumping the oil, and from the Alaska Department of Environmental Conservation said they believed that the oil had escaped through a pinprick-size hole in a corroded 34-inch pipe leading to the Trans-Alaska Pipeline System.

The pressure of the leaking oil, they said, gradually expanded the hole to a quarter- or half-inch wide. Most of the oil seeped beneath the snow without attracting the attention of workers monitoring alarm systems.

The leak occurred in a section of pipe built in the late 1970s, in the earliest days of oil production at Prudhoe Bay. The larger pipeline, which carries North Slope oil across the state, was completed in 1977.

Environmental groups were quick to point out that the spill raises doubts about the continuing reliability and durability of the infrastructure of North Slope production.

The current spill is among the worst in the pipeline's history, and the first of such a magnitude likely to be blamed on the decay of the aging system. In 1989, about 11 million gallons fouled Prince William Sound after the Exxon Valdez tanker ran aground. About 700,000 gallons escaped from the pipeline after vandals blew up a section of it in 1978, and about 285,000 gallons spilled in 2001 when a hunter shot the pipeline.

Asked later on Tuesday about how company and state officials arrived at their tentative conclusions about the cause of the spill, Ms. Johnson said investigators had "looked at the leak investigation system, at all the logs and all the charts" that measure oil volume and pressure at different times and in different areas.

At the news conference, Ms. Johnson said that although routine inspections last year indicated increasing corrosion in the pipe, the severity of corrosion found since the leak pointed to a swift and sudden deterioration. "We had no reason to expect" that this pipe, which carried 100,000 barrels of oil to the Alaska pipeline a day, "was going to leak," she said.

Ms. Johnson also said the leak was "smaller than our system would detect," adding that it was "still not acceptable to BP."

The normal fluctuations of oil flow in this particular pipe could have masked warning signals, state environment officials said. ❑

More Money Needed to Maintain Aging Icebreakers

New York Times, 16 December 2005, by Andrew C. Revkin—The nation's two heavy-duty icebreakers are nearing the end of their useful lives, and there is neither enough money to maintain them nor a plan to replace them, according to a report from a panel of the National Academies, the country's pre-eminent scientific body.

In a preliminary report requested by Congress, the panel said a lack of both money and a new generation of vessels could undermine the United States's ability to conduct defense, research and rescue operations in the Arctic and to open ice-clogged routes to supply American research stations in Antarctica.

The report noted that commercial activity was increasing in the Arctic as summer sea ice melted.

In February, the U.S. had to charter a Russian icebreaker to help resupply the McMurdo Sound and South Pole research stations in Antarctica, but the rising commercial activity in the Arctic is likely to reduce the availability of the Russian ships, the report said.

The United States has three large icebreakers. The most powerful, the *Polar Sea* and the *Polar Star*, both built in the 1970s, can smash through floes more than six feet thick, but they were designed to last 30 years and need increasing amounts of maintenance. The third, the *Healy*, was built in the 1990s and is designed for ice about four and a half feet thick. ❑

With Glaciers Atop Volcanoes, Iceland Zooms In on Signs of Unrest

Photo by Magnus Tumi Gudmundsson, courtesy of NY Times

An Icelandic volcano that erupted in November 2004.

New York Times, 17 January 2006, by Amada Leigh Haag, SKAFTAFELL, Iceland—The terrain in southern Iceland is as gritty as burned toast, pockmarked by glacial craters and sprinkled with boulders that can be as big as dump trucks. Keep driving, and you come upon fields of bumpy lava blanketed with moss. Hot air rises off the blackened plains like distant fumes.

These flood plains, known as sandar, extend some 800 square miles. Parts of the southern coast were formed some 9,000 years ago, when meltwater spilled out from under Iceland's cloak of glacial ice and galloped forward in violent surges called *jokulhlaups*, or glacial outburst floods. But *jokulhlaups* (pronounced YOKE-uhl-howps) are no geologic remnant of the distant past. They occur with almost predictable regularity today, and they may pose great risks to life and property in Iceland.

Glacial floods occur in many regions of the world where mountaintop glaciers sit on top of volcanic regions, as they do here. Fluids, gases and steam from active volcanoes continuously melt the overlying ice, creating pools of water sandwiched by glacial ice. Some of this water drains off at intervals, at times trickling out and other times leading to floods.

But the most potent type of glacial flood is caused by an erupting volcano. Glacial ice cloaks 10 percent of Iceland, a country that straddles the mid-Atlantic ridge and is a simmering cauldron of geothermal and volcanic activity.

Nearly 60 percent of volcanic eruptions in Iceland occur beneath glacial ice.

That is what worries scientists. Katla, one of Iceland's most notorious volcanoes, has erupted five times since 1721, at intervals ranging from 34 to 78 years. The last one was in 1918, so an eruption may be overdue.

"Basically everything you see to the east of Reykjavik is a wall of mountains formed in eruptions under glaciers," said Magnus Tumi Gudmundsson, a professor of geophysics at the University of Iceland, who added, "Katla has been showing signs of unrest over the last few years."

To head off catastrophe, geologists and civil engineers here have developed an extensive, exquisitely sensitive monitoring system intended to provide early warnings of floods. It has issued 16 accurate forecasts since 2001, though it has yet to contend with a major eruption.

When the birth pains of an eruption begin, pressurized magma oozes toward the surface of the volcano, leaving boiling groundwater in its path. Glacial ice acts as a lid on a giant pressure cooker: the thicker the ice, the more force with which it presses back against the erupting lava.

When a volcano erupts, magma as hot as 2,200 degrees Fahrenheit meets ice and boiling water, sending vast plumes of steam and rock particles rocketing upward in what Matthew J. Roberts, a glaciologist with the Icelandic Meteorological Office, compares to a classic mushroom cloud.

That is not all. Steam combines with tiny particles raining out of the eruption to create high static charges, causing lightning strikes several times a second. The 1918 eruption of Katla is said to have killed hundreds of heads of livestock grazing nearby—by electrocution.

Then come the *jokulhlaups* . "An eruption beneath a thick glacier often leads to a hazardous glacial flood that can begin within minutes to several hours after the eruption has started," Dr. Roberts said.

Floods after a volcanic eruption are a mixture of water, ash, mud and ice; they tend to leave the surrounding countryside covered in ash.

Records from floods in the 1800s indicate that icebergs of Titanic proportions were seen drifting near farmhouses. And one flood is thought to have heaved ice blocks for miles. Geologists are still uncovering this ice, which was buried by so much insulating debris that it is still there more than 150 years later.

In 1996, an eruption beneath the Vatnajokull ice cap, Europe's largest ice mass, led to a jokulhlaup that forced sediment, meltwater and ice out along the 12-mile stretch of the glacier's edge. The flow of water out of the glacier created a river to rival

the Amazon in size, at least for a few minutes. It demolished a bridge and added almost three square miles to the area of Iceland. (The

flood did not reach nearby settlements, and no one was killed or injured.)

The seismic monitoring system developed in the past few years consists of a network of instruments strung along the countryside like Christmas lights. The devices are similar to those used for monitoring volcanoes like Mount St. Helens, in Washington, but because Iceland is relatively small, the network is densely concentrated.

Unlike conventional seismometers, which detect tremors greater than a magnitude of 1, Iceland's have been fine-tuned to measure magnitudes of minus 1 or even lower.

These micro-earthquakes are thought to result from fractures only 100 feet long or so; the fault lines of earthquakes felt by humans tend to be 10 times as long. "But it's these very tiny cracks which are often the sign of something larger," Dr. Roberts said.

the quake's location, scientists can plot the movement of water.

In addition to the threat from flooding, volcanic meltwater often contains a toxic chemical cocktail that can cause breathing difficulties when the water rises to the surface. Last July, such a flood originated from an ice caldron underneath the western flank of Vatnajokull. "The floodwater was very rich in hydrogen sulfide, to the extent that a strange haze could be seen above the water surface on the river," Dr. Roberts said.

But this toxicity is also providing scientists with real-time monitoring of the likelihood of flooding; if the water has interacted with a geothermal system, it will carry an assortment of ions and give off a higher electrical conductivity. That, too, can be measured.

Eruptions, Icequakes and Flooding

Under Iceland's cloak of glacial ice lie active volcanoes, which can melt and move the massive glaciers, creating icequakes and violent flooding. These floods, called jokulhlaups, *occur regularly and pose great risk to life and property in Iceland.*

Once an eruption is under way—a process that takes place over days or weeks—meltwater spreads out like a sheet between the underlying rock and the base of the gla cier. The pressure causes ice to fracture in an "ice quake" within the glacier.

Using the new seismometers to determine

From the air, scientists can monitor the ice surface to keep track of accumulating meltwater under the glaciers. Increased melting is visible from the air in the form of a "melt pit," or ice caldron ; the caldron's growth indicates how much heat is being released from the volcano.

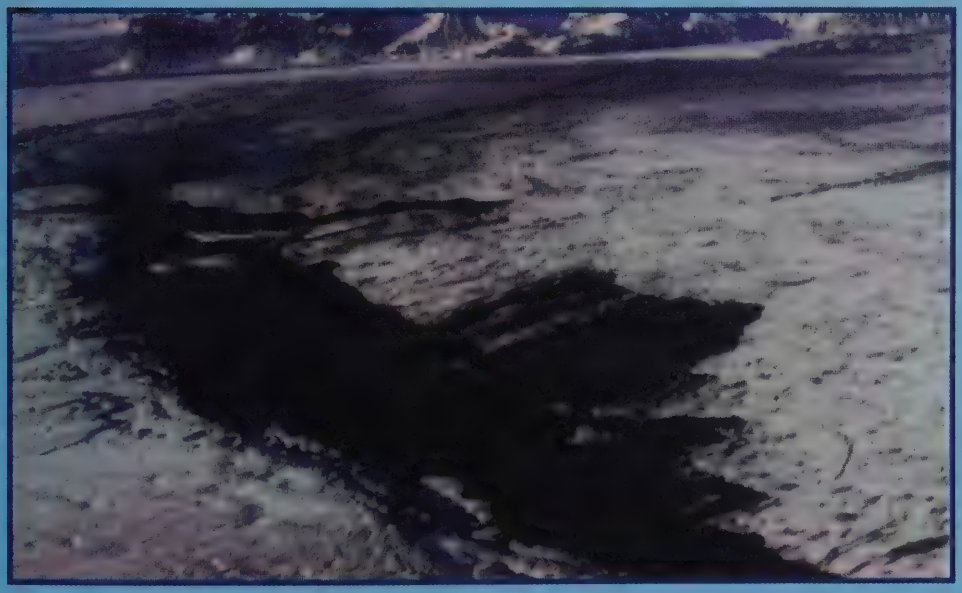


Photo by Magnus Tumi Gudmundsson, courtesy of NY Times

Another eruption caused a* jokulhlaup, *or outburst flood.

Photo by Amanda Leigh Haag, courtesy of NY Times

Andrew Russell (foreground) and Andrew Gregory set up a global positioning system to measure heights of the landscape.

Katla is situated precariously behind the village of Vik, roughly 16 miles away. In the last few years, the volcano grew more seismically active, began inflating in the magma chamber and showed increased geothermal activity.

At the end of 2004, it became quieter again. But the authorities here are taking no chances. In May, the Icelandic Civil Protection Department plans to conduct a large-scale evacuation drill in a region to the west where a jokulhlaup might engulf inhabited areas.

In the meantime, each new field season offers a natural laboratory of visible change for scientists like Andrew Russell, a glacial geologist from the University of Newcastle Upon Tyne in Britain, who headed out to the sandur last summer in a caravan of Land Rovers and cargo trailers with volunteers from the organization Earthwatch.

On that expedition, Dr. Russell pointed to an area about halfway up Skaftafellsjokull (*jokull* means glacier) where a fresh scab of glacier had just broken off after a small ice avalanche, revealing virgin layers of ancient ice and sediment.

At another field site, Dr. Russell pointed out a "kettle hole"—a pit formed when buried ice melts away. This one was filled with dangerous quicksand.

This year, his team may need to take inflatable rafts to cross a lake of meltwater where a glacier stood just a few years ago. Still, he is happy to get fresh access to river sediments that are deposited inside tunnels within the glacial ice.

"We can see some of these melting out beautifully at the moment," he said. "You get a real feel for the forces that are in operation." ❑

40-50-60 Years Ago in *The Polar Times*

This mid-year historical review will be a departure from our normal "20-40-60 Years Ago" series in that we will drop the 20-year edition and sandwich in a 50-year review. The two decades encompassed (1946–1966) were the seminal years of U.S. Antarctic scientific and physical exploration of the southern polar continent.

An important 50-year mark was begun in late 1955 and early 1956 with the successful completion of Operation Deepfreeze by the U.S. Navy's Task Force 43 that established bases at McMurdo Sound and Little America V at Kainan Bay. Both sites were built, provisioned and wintering-over parties safely ensconced in the months of December 1955 and January/February 1956. Favorable weather and ice conditions coupled with the unflagging energies and enthusiasm of the Task Force 43 members, both military and civilian, made possible the creation of the vital Antarctic infrastructure that was essential to the launching of the IGY in the Austral summer of 1957 and the years that followed.

In our next issue we will focus our attention on the 50th anniversary of the IGY with an in-depth review of the scientific and exploration achievements that began with the IGY. To leaven our review, we would also like to inject some personal experiences of our members who were "on the Ice" when it all began. Please drop me a letter or email affording some of your enduring memories of the people, places and things that happened in those first years of exploration and research. (Send email to cv1957@optonline.net or regular mail to P.O. Box 2595, Amagansett, NY 11930.) Accompanying photos or graphics would be greatly appreciated.

So many people have said that Polar experiences have been transcendent events in their lives. So, all you 50-year veterans, please share your memories of IGY and Antarctica, circa 1956–1957. ❑

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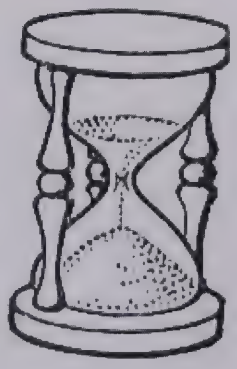
60 Years Ago—The June issue of *The Polar Times* was devoted in large measure to reporting on the Canadian military exercise, "Operation Muskox," an operation design to train forces in invasion tactics in extreme cold-weather environments. This was essentially a 3,100-mile trek with specially designed snow and all-terrain vehicles, with the forces being replenished by prearranged air-drops. The force of 60 combat specialists, along with five U.S Army observers, started the journey in northern Manitoba, crossed into the Northwest Territories, headed west and then south to British Columbia. Twenty-four hundred miles of this grueling trek were over untracked land, ice and snow. Needless to say, this was a major test of men and machines. It seems the men did well but many of the machines did not meet the measure (sound familiar?). Bitterly cold weather and violent snowstorms hampered progress; however, the mission was completed close to schedule in 81 days.



Elsewhere in this edition there is a report of U.S. Navy submarines exercising in the Aleutian waters. Four submarines transited from Kiska through the Bering Straits to 70°N before ice impeded further progress. Editorial comment on these Canadian and U.S. military operations suggested that "the Arctic could be a future theater of war." Thus began the Cold War??

50 Years Ago—*The Polar Times* June 1956 edition was a record 36 pages in length and devoted in the main to hailing the success of Operation Deepfreeze and the establishment of bases Little America V and McMurdo Sound. Quite likely the fact that several major newspapers, including *The New York Times*, had reporters, as we say today, "embedded," would account for the volume of articles touching just about every activity incident to this unprecedented polar operation. Certainly praise was deserved, and the press did not hold back. Admirals Byrd and Dufek were hailed for their planning and leadership, and all elements of Task Force 43 were scrutinized and afforded favorable and detailed coverage of their contribution to Operation Deepfreeze.

Elsewhere on the continent, British and Soviet parties were also engaged, albeit on a much smaller scale than the U.S., in establishing bases for their future exploration and scientific research in their segment of the Antarctic pie.

Political confrontation and Cold War rhetoric were non-existent between Soviet and Western nation in this non-military development of footholds in Antarctica. Ironically, the two pages of this issue devoted to the Arctic featured a long article, with graphics, on the completion of the DEW line, the string of early-warning radar stations constructed across the Canadian Northwest territories and into Alaska. These stations were to provide early warning of Soviet aircraft or missiles launch against North America.

In our January 2007 issue we will certainly revisit and draw materials from the June 1956 issue.

40 Years ago—The lead article and defining event of polar activity in 1966 is described in *The Polar Times* June issue as the establishment of a new station in Antarctica. Named the Plateau Station, this small and remote facility was situated a thousand miles from nowhere and was expected to encounter record low temperatures approaching –130°F. Described as "located in the eye of the constant storm," this site was said to experience little wind and less precipitation and was, consequently, in an ideal position to observe surrounding weather, aural events and magnetic storms. Manned by four Navy personnel and four scientists, the facility consisted of two pairs of vans airlifted in place with a fifth emergency van situated a thousand yards away (a place to retreat and survive in the event the other trailers were destroyed by fire!). ***[Editors note: Any member visit or man Plateau Station? Let's hear about it.]*** ❑

Arctic Town's Real Estate Booms on 'Oily' Hopes

Reuters, 19 May 2006, HAMMERFEST, NORWAY—House prices in one of the world's most northerly towns are rocketing, thanks to hopes for an Arctic oil and gas boom, and the local council can finally afford a fence to keep out reindeer.

"A new era is coming," Alf Jakobsen, mayor of the Norwegian port of Hammerfest, said in his office, where the town's polar bear crest hangs on a wall. High oil prices, new technology to offset freezing conditions and prospects that global warming may melt polar ice are making once inaccessible reserves in the polar region suddenly attractive to oil and gas firms.

Hammerfest, perched on the tip of Europe and home to around 9,600 people, has become a testing ground for how remote communities will be affected if the Arctic becomes Europe's biggest construction site in coming decades.

The US Geological Survey said a quarter of all undiscovered oil and gas may be in the Arctic. Countries ranging from the US to Russia are looking north, partly to help break dependence on supplies from the volatile Middle East.

At the heart of Hammerfest's optimism is the Snoehvit natural gas field, 140 km offshore, and a gas processing plant being built by Norwegian energy group Statoil on nearby Melkoya island at a cost of $9.6 billion.

Snoehvit will be the world's most northerly plant for liquefied natural gas when it comes on stream in 2007.It is the biggest industrial project ever for Norway's northernmost region. Norway has said it will impose tough environmental demands on energy companies looking to explore in the pristine region. ❑

About Our Centerfold

"On Sept. 12, 2005, while conducting a ship-based expedition across the North Atlantic from Svalbard to NE Greenland, we sailed with zodiacs into the waters of NE Cape [Gladstone] of Liverpool Land. **{Editors note: A careful look at the left side of the photo reveals personnel and zodiacs at the water's edge.}** ***Liverpool Land is a mountainous peninsula at 71°N in East Greenland, just south of the national park. It has a maritime microclimate allowing glaciers to form at very low elevations above the sea. As a geographical construct on all maps, the Gladstone region is a peninsula with three mountainous fingers webbed by glaciers formed near sea level. The isthmus that connected it to the Liverpool mainland is, however, now gone. It appears that the isthmus was all ice. A new strait has formed. Tore Andreasen, director of the meteorological station in Scorsbysund Village, reported no knowledge of the new island, nor did hunters in the village. This new island is significant because it appears to be a clear product of climate change."*** **—Dennis Schmitt. (Photo by Jean-Yves Jouanet)** ❑

International Polar Year News

IPY May Bring Antarctic Boom

***www.scoop.co.nz*, 19 April 2006**—A station set to be built by Estonia in New Zealand's Antarctic claim is part of an Antarctic construction boom expected next summer.

The development rush has been linked to the declaration of 2007 as international polar year, *The Age* newspaper reported yesterday.

Among the planned projects:

- **Estonia**, which joined the Antarctic Treaty five years ago, wants to build a small, summer-only base for six people comprising two 5m^2 huts, a small shed and fuel storage at Edmonson Point South, 350km northwest of Scott Base. Estonia is currently running behind schedule for construction due to a shortage of funds.
- The **Czech Republic** will open its climate research station on James Ross Island next December.
- **Belgium** is developing a base between Russia's Novolazarevskaya and Japan's Syowa, in the Dronning Maud Land region. It will accommodate 20 people over the summer of 2007-2008.
- **China**, through an expedition sponsored by the Petrochina Lubricant Company, has surveyed a peak in the ice cap 1100km inland, known as Dome A, for a new station, the Xinhua news agency said.
- **India** appears to have rejected Australia's offer to share Mawson station. Instead it plans to start building its own facility next y ear in the Larsemann Hills area or nearby McLeod Island in Prydz Bay. Delhi's plans will be put before the next Antarctic Treaty meeting in June.
- **South Korea** is preparing to build a $US74 million station at an undisclosed site in the Antarctic interior, according to the *Korea Times*. ❑

NSF Launches IPY Web Site

17 January 2006—The National Science Foundation today launched a portal Web site [www.us-ipy.gov] to provide news releases, classroom resources, listings of museum and gallery exhibits, and catalogs of video and still images and other materials produced or supported by the federal government as part of the U.S. contribution to the International Polar Year (IPY) 2007-2008.

The IPY will take place exactly 50 years after the International Geophysical Year (IGY). The polar "year" will include two calendar years to permit a full 12 months of observations in regions where six months of extreme cold and darkness can hamper fieldwork.

In early 2007, scientists from more than 100 countries will embark on an intensive, coordinated campaign of multi-disciplinary scientific observations, research and analysis as part of the IPY. The research is expected to dramatically expand understanding of the Arctic and Antarctic regions. ❑

IPY TV: Call for Contributors

A production team developing a documentary on the IPY is seeking motion-picture footage and still photographs taken during the IGY 1957-1958, as well as IGY veterans interested in participating as interviewees.

If you have film, photos or stories to tell, please contact APS Governor Sheldon Bart at WildResch@aol.com or 201-451-3860. Sheldon is working on the project with Dr. Raymond Sambrotto of Lamont-Doherty Earth Observatory and television director Tom Bell. ❑

Due South

by Jeff Rubin, Antarctic Editor

Norman Off on Next Great Journey

Norman Vaughan, America's oldest Antarctican, is dead.

The Colonel died 23 December 2005, but not before attaining a goal that he talked about often in his later years—reaching his own century mark on 19 December.

"I'm going to live to be 100," he'd tell you in that distincitve, happy, still-Bahstan-tinged voice and with his trademark gleam in his eye, "because not many people die after that."

Norman did indeed live to 100.

Soon after, he slipped into a coma and four days later embarked on his next great adventure, the one that awaits us all.

But what a party he had before he left!

Typically for ever-optimistic Norman, as circumstances changed, he adapted without complaint.

Norman frequently spoke of his desire to celebrate his centennial atop his Antarctic mountain, 10,320-foot Mt. Vaughan, named for him by Admiral Byrd after their 1928-30 expedition together.

Norman had already summited at the age of 88, with his wife, Carolyn Muegge-Vaughan, and friends including alpinist Vern Tejas.

In the last year or so, when it became obvious—even to Norman—that another climb was impossible (at least this year), he and Carolyn moved to Plan B: holding the party at a favorite spot in Telluride, Colorado.

When ill health prevented Norman from travelling from Providence Alaska Medical Center in his hometown of Anchorage, he and Carolyn shifted to Plan "B-2": setting up a video teleconference connection to the Telluride "branch" of the party and inviting those who could to come celebrate with them in Alaska.

As Beth Bragg reported in the *Anchorage Daily News* on 21 December 2005, Norman—a lifelong teetotaler—finally got his first taste of alcohol (champagne) at his biggest birthday bash, held two days before his actual birthday.

Norman was a very different man from British economist John Maynard Keynes, of whom it is said that on his deathbed he expressed only one regret: that he had not drunk enough champagne.

Norman had no need for bottled bubbles, having lived a bold, adventurous life that provided its own effervescence.

When his first drink came—after a crowd of 100 sang "Happy Birthday"—Norman took just one sip.

"That's all you can have," said Carolyn.

"I don't want any more," said Norman.

Carolyn later wrote that Norman "did NOT like his first drink, which of course was champagne. He made an awful face and did NOT want a second taste! It was quite funny."Among the many stories recounted in Bragg's article, my favorite is "a particularly unappetizing tale" by Ed Craver of Talkeetna.

It seems Norman was driving a fellow musher's truck to Anchorage from his home at Trapper Creek when he got hungry. Noticing a can of what he assumed was granola on the passenger seat, Norman ate the contents as he drove along. When he handed the truck over to his buddy, he commented that the granola was "too dry."

His astonished friend told Norman that the can held not granola, but the cremated remains of his lead dog.

I first met Norman when I interviewed him for a magazine piece I was writing. We had breakfast at the Mayflower Hotel in New York City, and it was great fun. He was a true storybook hero come to life—so handsome with his closely-cropped white beard and so friendly and polite to everyone he met.

A few years later I got a call from Brian Shoemaker, who single-handedly saved the American Polar Society from a certain death in 1993 when he resumed publication of *The Polar Times*. May we all be forever grateful.

"Listen, Jeff, you know Norman Vaughan, right?" Brian asked from Oregon. "He's coming to New York for the Explorer's Club [1995] annual dinner, and he can't find a room anywhere in town. Could you put him up for a night?"

"Sure," I said. "I'd be honored."

"There's one more thing," Brian said. "He's bringing his wife Carolyn and a mountain climber, Vern Tejas. They're used to bunking down wherever, so it shouldn't be a problem."

Young Norman Vaughan

A few days later, I met their cab as it pulled up in front of the beautiful brownstone I lived in on tree-shaded Charles Street in the West Village.

Norman humped his own big bag up three long, steep flights of stairs to my two-room apartment. He was breathing hard when we reached the top, but soon exclaimed in delight at my "quarters."

Later, as he and Carolyn and Vern prepared to freshen up after their trip and get dressed for their dinner, I said goodbye and headed uptown to stay with Stephanie, soon to become my wife.

In those days, though, I was single, and—having an apartment in a great neighborhood in one of the world's great cities—I had a lot of visitors. So many, in fact, that my sister Ann gave me a guest book for people to sign. I still have it today, full of fine memories.

The next morning, Stephanie and I met Norman, Carolyn and Vern for a late breakfast at Anglers and Writers, a nearby restaurant. We enjoyed hearing about their successful climb of Mt. Vaughan, as well as the proceedings of the night before.

Later, I read what Norman wrote in his beautiful, flowing handwriting in my guest book:

> **"24,25 March, 1995—Norman D. Vaughan, Trapper Creek, Alaska**
> From our one room log cabin to your quarters is a luxurious step. You have electricity—we do not. You have running water—we have a pump at the sink. You have a flush toilet—we have a three-holer but a picture window. You have a bicycle—we have a dog-team."

He also thanked me for my hospitality, and noted that he had "stayed up till long after 2 AM lost in your *Chronological List of Antarctic Expeditions*" [by Robert Headland].

It's still hard to believe Norman's gone. He kept going for so long, and with such spirit. What an inspiration. *Hail and farewell!* ❑

Norman Dane Vaughan Dead at 100

***New York Times*, 27 December 2005, by Wolfgang Saxon**—Norman Vaughan, a legendary Alaskan explorer and dog sled racer, and the last surviving member of Adm. Richard E. Byrd's expedition to Antarctica in 1928-30, died Friday at a hospital in Anchorage. He was 100.

To mark his 89th birthday in 1994, Mr. Vaughan climbed an icy 10,302-foot peak about 250 miles short of the South Pole that Byrd had named Mount Vaughan in his honor. His wife, Carolyn Muegge-Vaughan, who was 52 at the time, accompanied him on the eight-day climb.

Filmed by a cameraman-producer from the National Geographic "Explorer" series, Larry Engel, Mr. Vaughan's exploit became the focus of a documentary, "Height of Courage," first shown in 1995. It was a feat Mr. Vaughan had had in mind for 66 years; a first attempt a year earlier ended with a supply-plane crash and the loss of four of his dogs.

In Alaska, his adopted home state, he was known as the Colonel and was celebrated for having completed the Iditarod, the punishing annual dog sled race, 13 times despite injuries that would have daunted far younger contestants. He had made his debut on that 1,160-mile trans-Alaska run in 1976, when he was almost a septuagenarian.

In 1997, at age 92, he founded what became the 800-mile Norman Vaughan Serum Run 25, a memorial to the winter of 1925, when diphtheria struck the town of Nome. Relay teams of mushers raced nonstop from Nenana in central Alaska to Nome on the Seward Peninsula with the serum that fought the deadly outbreak.

Norman Dane Vaughan had his moment in the national limelight when he joined Byrd, then a celebrated aviator, for his first ground incursion into *terra incognita*, the forbidding polar region known as the Ross Ice Shelf. He had grown up comfortably in Boston, a graduate of Milton Academy and a student at Harvard who was intrigued by books about the outdoors that covered, among other subjects, dog sleds.

He dropped out of college and, at 19, worked with a mission tending indigenous people in Labrador and Newfoundland, becoming a dog sled leader himself. Three years later, in 1928, he put that experience to use when, alerted by a headline—"Byrd to the South Pole"—he got himself a spot on the admiral's team.

Byrd took him on as a dog driver, to train the animals and accompany him by dog sled over the Ross Ice Shelf to find a place for his base camp, Little America. Mr. Vaughan then helped in sledding hundreds of tons of supplies from ship to camp and transporting team members over hundreds of miles of frozen wilderness in search of specimens for their research.

Mr. Vaughan later worked as an advertising executive, a snowmobile dealer, a ski instructor and a sled-dog trainer and racer in Alaska, where he became a celebrity and was inducted into the Mushers Hall of Fame upon completion of his final Iditarod run at 84. In World War II, he was a search-and-rescue specialist for the Army Air Forces.

Mr. Vaughan was married four times. Besides his wife, Carolyn, he is survived by a son, Jerry; a daughter, Jackie Lee; a sister, Janice Snow; five grandchildren; and 10 great-grandchildren.

Mr. Vaughan told of his adventures in two books, *With Byrd at the Bottom of the World: The South Pole Expedition of 1928-1930* (Stackpole Books, 1990), written with Cecil B. Murphey; and *My Life of Adventure* (Stackpole, 1995), with Mr. Murphey as well.

"I put foot on rock that had never been seen or touched before by humans," he told the *New York Times* magazine in 1999. "We went into mountains beyond the curvature of earth, into land where nobody else had been. When we got home, Admiral Byrd named a mountain in the Antarctic after me. I told him that one day I would go back to climb it, and he said, 'Norman, I think you will.'" ❑

Norman Dane Vaughan in 1995, at age 89

***Daily Telegraph*, 27 December 2005**—Norman Vaughan, who died on Friday, aged 100, was the last surviving member of the Byrd Antarctic expedition of 1928-30 and remained an adventurer until he was well into his ninth decade.

The Byrd expedition—privately organised and led by Commander (later Rear-Admiral) Richard E. Byrd of the U.S. Navy—was, apart from whaling and sealing voyages, the first such American journey to the Antarctic for more than 80 years and the first Antarctic expedition from any country to make extensive use of aircraft.

...The expedition is best-remembered for making the first flight to the South Pole, in a Ford 4-AT tri-motored monoplane piloted by the Norwegian Bernt Balchen with Byrd himself as one of the two navigators. But of much greater geographical and geological importance was the sledge journey to the Queen Maud mountains, lying immediately east of the Beardmore glacier, up which the Shackleton and Scott expeditions had struggled nearly 20 years earlier.

This journey of about 900 miles was led by the geologist Laurence Gould, with Vaughan in

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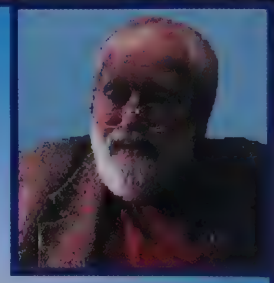
Remembering a Pioneer: Norman Vaughan



***KTVA Online*, 24 Dec 05, by Ali Reed, CBS 11 News Reporter**—Alaska has lost its father figure today. Colonel Norman Vaughan passed away this morning just four days after his 100th birthday. Alaskans mourn his loss today.

Colonel Norman Vaughan is perhaps best known as a member of Admiral Richard Byrd's 1928 expedition to the South Pole. His life continued to evolve. Friends say he reinvented his life at age 70, where he went on to finish the Iditarod six times.

This afternoon his close friends shared their personal memories of the friend they will deeply miss.

"He was always very curious about what was going on around him in the world and he'll be missed," said friend, Bob Hickel.

These are the sentiments shared by those close to Vaughan as well as those who never knew him personally. But he touched their lives nonetheless. Bob Hickel has been a close friend of Vaughan's since the late 1980s. He owns Fletcher's, which was Vaughan's favorite restaurant to dine at. He would frequent it three to four times a week for years and always had the same seat. His lunch hour was a time that many would look forward to, especially his favorite waitress.

"People would come to the bar just looking for him. He'd remember something about every person. He'd remember their children, your hobbies--he's fantastic," said Paula Crowley, manager at Fletchers.

She says she'll miss seeing those big blue eyes every week....and how he used to share his stories with her, and also how he wanted to learn about others' adventures.

Friends describe him as a curious and selfless person and an inspiration to everyone. He taught many Alaskans to never stop dreaming: a lesson those close to him will carry with them.

"His slogan was: 'Dream big and dare to fail,' and that's definitely a great thing to go by. It's how young you feel," said Crowley.

A message Vaughan himself carried with him til the day he died.

"You know he hit that hundred and he crossed a finish line and he felt good and he is a man with no regrets," said Hickel.

As a way to keep Vaughan's spirit close to them, Hickel intends to memorialize his regular seat at his favorite restaurant.

"I was thinking of putting a little plaque right here: Norman's seat...Norman Vaughan...just something that says, 'Norman's spot,'" said Hickel.

Vaughan had hoped to return to the mountain named after him in Antarctica for his 100th birthday. The last time he had been on its summit was three days before his 89th birthday. Unfortunately, he was too sick to leave the hospital to make it to the top...one final time.

Hospital officials say that Vaughan passed away peacefully at Providence Medical Center this morning surrounded by his friends and family. ❑

charge of the dogs. The party of six left Little America on 4 November 1928, returning on 19 January. By this stage Vaughan had fallen out with a fellow dog-driver, Arthur Walden, who felt that the young man had usurped his position on the expedition; so sure was Vaughan that Walden would do him harm that he took to sleeping in secret locations outside, despite the freezing temperatures.

...Norman Dane Vaughan was born at Salem, Mass., on December 19, 1905, the son of a wealthy leather tanner who invented a white shoe polish. After Milton Academy, Norman went on to Harvard. From boyhood he had been fascinated by the stories of the great polar explorers, and he left university after being accepted for the Byrd expedition. He spent a winter in New England learning the art of dog-driving and also gained experience in driving dog-sledges with the Grenfell Mission in Labrador. ❑ *[This story is edited from the original.]*

Norman, the Pope, a Sled and Satan

***Daily Telegraph*, 1 January 2006, by Mary Wakefield**—Norman Vaughan's life put most other people's to shame, but often and especially mine. My father, a great pal of his, hoped Norman stories would inspire Wakefield offspring to attack life with a more Vaughanish vim. Be like Norman, urged Father.

...But the most inspiring thing about Norman was that when he was nearly 70, at an age when most men settle down to a life of elasticated trousers and shouting at the television, Norman upped sticks and began again. In need of adventure after the collapse of his marriage, he packed a duffel bag with underwear, two books, a wet-suit and snowshoes, tucked a $100 bill into his sock and bought a one-way ticket to Alaska, where he raised the money for a new dog team by cleaning the university loos.

My father was quiet over Christmas—he'd been the last person to speak to Norman, who woke up briefly and unexpectedly from his coma to say goodbye long-distance down the phone—but he told me a final Norman story by way of a valediction.

In 1981, Norman heard that Pope John Paul II was to visit Alaska and decided to treat him to a ride on a dog sled. So he knocked up a sled shield of bullet-proof glass, convinced the anxious authorities that it was an unbeatable scheme and went to pick up his holiness at the airport.

As John Paul stepped off the plane, Norman had another idea. "Why don't you drive the dogs yourself," he said, and gave the Pope the reins. His brainwave was followed swiftly by a dreadful realisation: his two lead dogs were called Satan and Devil. Should he tell the Holy Father? A lesser man would have kept quiet, but Norman confessed, apologised and waited.

There was silence for a moment. Then the Pope said: "How could I miss the opportunity to drive the Devil in front of me?" and the two old men skidded off together, laughing. ❑ *[This story is edited from the original.]*

***Associated Press*, ANCHORAGE, 23 December 2005**—Norman Vaughan, who as a young man explored Antarctica with Admiral Richard Byrd in what was to become a life full of adventure, died Friday just a few days after turning 100 years old.

Vaughan, a Salem, Mass., native, died at about 10:30 a.m. at Providence Alaska Medical Center surrounded by family and friends, said nursing supervisor Martha George.

Vaughan was well enough on Saturday to enjoy a birthday celebration at the hospital attended by more than 100 friends and hospital workers. His actual birthday was Monday and he celebrated again, but grew increasingly tired as the week progressed, said friend Susan Ruddy.

Ruddy was at Vaughan's bedside when he died. He went peacefully, she said.

"Suddenly we realized he wasn't breathing," Ruddy said. "It was just a completely easy departure and it seemed so wonderful to us that it happened on a lovely snowy day. He loved winter. He loved snow. It was almost as if he waited for a snowy day to make his last journey." ❑ *[This story is edited from the original.]*

Dream Come True

MAP COURTESY BILL LITTLEWOOD

ON 'HIS' ROCKS: Littlewood unfurls the Explorer's Club flag at Littlewood Nunataks.

For veteran Antarctic oceanographer and longtime Senior Foreign Service officer Bill Littlewood, a dream that he thought "couldn't come true" did just that early in 2004.

Nearly half a century after he saw a group of unnamed nunataks along the Weddell Sea coast from the deck of *USS Edisto*, Littlewood set foot on the outcrops that had come to bear his name.

The generosity of the Argentine government made possible the realization of the Bethesda, Maryland resident's long-cherished wish.

Littlewood Nunataks, four dark brick-red, lichen-covered peaks, each about 50 yards wide, protrude from the Antarctic ice at 77°53'S, 34°20'W, near the eastern edge of the Filchner Ice Shelf. Rising to about 820 feet between Schweitzer and Lerchenfeld Glaciers, they were discovered by the German Antarctic Expedition of 1911–12 under Wilhelm Filchner.

The first recorded visit—lasting just a few minutes—was made by John C. Behrendt of the U.S. Geological Survey, by helicopter from Edisto on 28 January 1959. "I made a gravity measurement, built a cairn and left a message," Behrendt recalled recently. He also collected geologic samples that were later dated, and in the 1990s the petrology and date suggested a connection with rocks in Texas. That means that this part of Antarctica was attached to North America almost a billion years ago, long before Gondwana was formed.

Behrendt named the nunataks in Littlewood's honor, and the appellation was approved by the U.S. Board of Geographic Names in recognition of Littlewood's role in operations Deep Freeze 1–4.

Littlewood's landing on "his" rocks came after he told an Argentine official at an Explorer's Club dinner in New York City in 2003 of his wish to return to the area near Argentina's Belgrano station located at Bertrab Nunataks, just six miles from the Littlewoods.

In what is surely a testament to Littlewood's finely honed diplomacy skills, he eventually was invited to travel as a guest aboard the Argentine icebreaker *Almirante Irizar* on its annual Antarctic resupply voyage.

On 4 February 2004, Littlewood was flown by helicopter to the highest of the Littlewoods, the same peak visited by Behrendt. With the help of 15 accompanying officers from Irizar, he built a cairn containing a document describing the site's history and commemorating his visit.

Now 82, Littlewood says: "It was a wonderful experience to actually stand on them." ❑ ***by Jeff Rubin, Antarctic Editor***

Editors' Note: Send us a story about visiting "your" peak, glacier, ridge, etc. à la Bill Littlewood or Norman Vaughan, whose epic climb of his namesake 10,302-foot mountain in 1994, three days before his 89th birthday, is well-chronicled. We'd love to hear from you.

Oversnow Supply Caravan Completes Pole Round-Trip

***National Science Foundation*, 7 February 2006**—A four-year project to test the possibility of transporting equipment and material from McMurdo station to the South Pole has ended in success.

The NSF convoy returned to McMurdo 14 January after a 2,056-mile roundtrip in which it delivered nearly 110 tons of cargo, including two tractors, equivalent to 11 loads aboard a Hercules LC-130.

Officials said the traverse demonstrates that tracked vehicles towing cargo are a viable alternative for supplying the remote research station, currently done by air.

Staffed by seven men and one woman, the caravan towing sleds of cargo, fuel and life-support modules left McMurdo 11 November 2005 and ascended more than 9,300 feet to the Pole, reached 23 December.

In each of the past three years, traverses have covered steadily increasing distances between McMurdo and the Pole, overcoming such obstacles as crevasse fields and enormous areas of soft snow, including a 180-mile stretch of deep powder referred to as the "snow swamp."

"Reaching the Pole safely and returning to McMurdo over the same track represents an outstanding accomplishment," said David Bresnahan, logistics manager for NSF's Office of Polar Programs. "Delivering cargo to Pole on this traverse is beyond our expectations."

The overland transport capability removes two major engineering and logistical constraints—cargo size and weight—that have limited the design of large scientific instruments and infrastructure. Until now, everything at the Pole had to be designed in individual sections that could be transported in the cargo bay of the Hercules.

The ground transport mechanism is also well-suited for the delivery of the large quantities of fuel needed at the station. Moreover, by providing an alternative to air supply, the traverse will free up planes for the support of scientific research in remote parts of the continent.

With completion of the proof-of-concept traverse, NSF will purchase equipment to implement the full-scale traverse capacity for resupply of the South Pole station as recommended by the OPP. ❑

NSF/USAP PHOTO BY SCOT JACKSON

LONG ROAD: Traverse leader John Wright drove his Cat Challenger 95 tractor 2,056 miles round-trip to the Pole.

Antarctic Notes

Borchgrevink Sledge Found in Museum Cellar

***Sunday Tasmanian*, 14 May 2006, by Simon Bevilacqua**—An historic sledge, thought to be the first ever to go to Antarctica, has been found in the Tasmanian Museum and Art Gallery. The rare relic is believed to have been made by Laplanders who had been recruited for their dog-handling expertise by Norwegian Carsten Borchgrevink. The sled is on display in the "Islands to Ice" exhibition at the museum. ❑

Japan Boosts Whale Sales to Whet Demand

***Reuters*, TOKYO, 10 May 2006, by Elaine Lies**—In an effort to whet an appetite for whale meat among younger consumers, a new Japanese company is set to expand sales to include school lunches and family-restaurant chains. Japan's hunt of 850 minke whales from Antarctic seas nearly doubled from the previous year, and for the first time included 10 endangered fin whales. "Up to now, the amount of whale meat was limited," said Noriyoshi Hattori, director of the Institute of Cetacean Research, which conducts Japan's whaling, "so ordinary people couldn't really get their hands on it." ❑

SCAR Announces Honors

***Victoria University of Wellington* press release, 26 April 2006**—Professor Peter Barrett, director of the Joint Antarctic Research Institute at Victoria University, has been awarded the Scientific Committee on Antarctic Research (SCAR) President's Medal for Outstanding Achievements in Antarctic Science. Dr. Paul Mayewski (U.S.) won the SCAR Medal for Excellence in Antarctic Research and Dr. David Walton (U.K.) the SCAR Medal for International Scientific Coordination. ❑

Drake Opening May Be Tied to Cooling

***University of Florida* press release, 20 April 2006, by Aaron Hoover**—University of Florida geologists have used a rare element found in fish teeth to date the opening of the Drake Passage to about 40 million years ago, allowing the formation of an ocean current around Antarctica, an event that preceded and may even have caused Antarctica's cooling. UF associate professor of geology Ellen Eckels Martin co-authored a paper on the research in *Science*. Antarctica is known to have been covered with ice by about 33.6 million years ago. ❑

Scientists Find Frost-Resistant Plant Gene

***Australian Broadcasting Corp. Online*, 10 April 2006**—Australian scientists have discovered a gene in Antarctic hair grass that could prevent frost damage to wheat, saving farmers billions of dollars a year. The Victorian Department of Primary Industries (DPI) team plans to use it to breed frost-resistant wheat and barley. ❑

Iceberg Slams Drygalski Ice Tongue

***European Space Agency*, 7 April 2006**—ESA's Envisat satellite captured images of iceberg C-16, 18.5 km by 55 km, ramming the 80 km-long Drygalski Ice Tongue in the Ross Sea on 30 March 2006, breaking off the tongue's easternmost tip and forming a new iceberg 13 km by 11 km. ❑

Penguins Survived When Dinosaurs Died

***Australian Broadcasting Corp. Online*, 7 April 2006, by Marilyn Head**—New analysis of the world's oldest fossil penguins confirms some birds survived the mass extinction that killed the dinosaurs 65 million years ago. The penguins once lived in shallow seas off New Zealand's east coast 60 million years ago. A study published in *Molecular Biology and Evolution* links them closely to modern penguins. ❑

Antarctic Birds Breeding Later

***BBC News*, 4 April 2006, by Paul Rincon**—Antarctic seabirds may be breeding later in response to climate change. French researchers Christophe Barbraud and Henri Weimerskirch analysed data collected by ornithologists at Dumont d'Urville station between 1950 and 2004 on the nine species of bird that breed on continental Antarctica. Four species are arriving at their colonies an average of nine days later and two species are laying eggs on average two days later than they did in the 1950s. Most other species arrived and bred later, but the trends were not statistically significant at levels set by the French team. They think the delays are linked to changes in East Antarctic sea ice. Details in *Proceedings of the National Academy of Sciences*. ❑

Balloon Data Confirms Warming

***Scientific American Online*, 31 March 2006**—A new analysis of the past 30 years of records from nine research stations, including the South Pole, reveals that the air above the entirety of Antarctica has warmed by as much as 0.70°C per decade during the winter. John Turner of the British Antarctic Survey and his colleagues report in today's *Science* that this warming trend is consistent across data from multiple stations run by multiple countries using multiple types of instruments. This warming has implications for snowfall on the continent as well as the melting of land-based ice, potentially leading to global sea-level rise. ❑

Heat-Loving Bug Found Under Lake Vostok

***BBC News*, 30 March 2006, by Gabrielle Walker**—Researchers have found genetic traces of a thermophilic bacterium in Lake Vostok sediment mixed with a core of ice drilled by Russian and French researchers. The bacterium, which usually lives in temperatures of 50-60°C, may suggest that hydrothermal vents exist on the lake floor. "We expected to find life adapted to a cold environment," said Jean-Robert Petit of the Laboratory of Glaciology and Geophysics of the Environment in Grenoble, France, "but instead we found exactly the opposite." ❑

50-Year-Old Japanese Film Revived

***[Melbourne] Age*, 29 March 2006**—A pioneer of Japan's Antarctic expeditions has kept 8mm film of Antarctic scenes for nearly 50 years and recently made it available on DVD. Yoshimichi Harada, the former head of the Geographical Survey Institute, took part in the second and third of the expeditions begun by Japan in 1956. The images show the Sakhalin huskies Taro and Jiro which miraculously survived the Antarctic winter after being marooned at Showa base, and the rescue of the beset Japanese icebreaker *Soya* by the icebreaker *USS Burton Island*. ❑

Both Arctic and Antarctic May Warm Rapidly

***National Center for Atmospheric Research (NCAR)* press release, 20 March 2006**—Arctic and Antarctic ice could melt more quickly than expected this century, according to two studies, reported in the March 24 *Science*, led by scientists at NCAR and the University of Arizona. Blending computer models with paleoclimate records, the studies show that Arctic summers by 2100 may be as warm as those 130,000 years ago, when sea levels rose 6m higher than today. The studies are the first to link Arctic and Antarctic melting in the last interglacial period. The rise in sea levels produced by Arctic warming could have helped destabilize Antarctic ice shelves and led to their collapse. ❑

Warbling Whales' Language Complex

***Massachusetts Institute of Technology News Office*, 21 March 2006**—The songs of the humpback whale—patterns of moans, cries, and chirps—are among the most complex in the animal kingdom. Researchers have now mathematically confirmed that whales have their own syntax that uses sound units to build phrases that can be combined to form songs lasting for hours. Until now, only humans have demonstrated the ability to use such a hierarchical structure of communication. The research is published online in the March 2006 *Journal of the Acoustical Society of America*. ❑

Meteorite Crater Clue in Ross Sea

***BBC News*, HOUSTON, 17 March 2006, by Paul Rincon**— Researchers from the Lamont-Doherty Earth Observatory studying a 100km-wide

depression known as Bowers Crater under the Ross Sea say it points to a meteorite some 5km across having impacted about three million years ago. ❑

Huge Krill Population Found

***[Melbourne] Age*, HOBART, March 16, 2006, by Andrew Darby**—Australian scientists aboard *Aurora Australis* have found enormous aggregations of krill in the south-western Indian Ocean sector of eastern Antarctica. Expedition leader Steve Nicol said the new figure of krill biomass was likely to be in the order of tens of millions of tonnes, more than double previous estimates: "We sailed over krill for about 200 nautical miles on a couple of occasions." At the same time, krill are also absent from much of Antarctica's waters. ❑

Russian Defiant on Lake Vostok

***Reuters*, MOSCOW, 6 March 2006, by Christian Lowe and Denis Pinchuk**—Rejecting misgivings of their international peers, Russian scientists say they will drill into Lake Vostok by 2008. "The drilling will continue," said Valery Lukin, head of the Russian Antarctic Expedition. "We are not violating any rules. If our activities don't suit people, what can I say? It's like this: who was the first to fly to the moon? The Soviet Union or the United States? That time the Americans won and we halted our lunar program. Now this time we are going to be first. So what? We just got luckier, that's all ... It's all been turned into politics. Some people don't like [what we are doing] because it is not them doing it." ❑

Emperors Win Oscar

***Associated Press*, 5 March 2006, by Jake Coyle**—Luc Jacquet's surprise hit *March of the Penguins* won best documentary at the Academy Awards. It has earned $77 million in the U.S., making it the second-most lucrative documentary after *Fahrenheit 9/11*. ❑

Antarctica Losing Ice to Oceans

***BBC News Online*, 2 March 2006, by Richard Black**—Researchers using satellites to plot changes in the Earth's gravity in the Antarctic during 2002-2005 conclude that the continent is losing 152km^3 of ice each year, with most loss in the west. The new study by scientists at the University of Colorado at Boulder, published in *Science*, uses a previously-untried technique: measuring gravity over Antarctica. The mass of the East Antarctic ice sheet appears to be constant. ❑

Last Flight Saves Espresso Maker

***Christchurch Press*, 2 March 2006**—A last-minute mercy dash has prevented the unthinkable as Scott Base begins six months of isolation: a broken espresso machine. The weather delay of the last scheduled flight from Christchurch proved a blessing, allowing a replacement part to be dispatched, along with fresh fruit and vegetables accidentally left off the previous flight. ❑

Blue Whales Slowly Increasing

***Independent Online (www.iol.co.za)*, 27 February 2006, by John Yeld**—Researchers for the International Whaling Commission (IWC), working from the non-hunting Japanese research ship *Shonan Maru No 2* and using special rifles to take skin biopsies, counted 63 blue whales, 295 fin whales, 532 humpbacks, 971 minkes, 75 orcas, 37 sperm whales, 24 southern bottlenose whales, and three southern rights in a two-month cruise between longitudes 0-20°E. While they said it was difficult to draw conclusions from a single survey, the large number of blue whales spotted compared to past voyages was expected "given that we now know they are increasing." ❑

46th Emperor Colony Found, on Phantom Coast

***The Australian*, 22 February 2006, by Brendan O'Keefe**—Guest lecturer Mary-Anne Lea of the University of Tasmania and expedition leader Tim Soper, travelling aboard the Russian icebreaker *Kapitan Khlebnikov* in December 2004 and January 2005, found a new colony of emperor penguins on Siple Island in Marie Byrd Land in the Antarctic region nicknamed the "Phantom Coast" because little is known about the area. The colony, the 46th known, contained about 5000 adults and 2500 chicks. The discovery was announced last week in *Marine Ornithology*. ❑

Chinese Collect 5,354 Meteorites

***ShanghaiDaily.com*, 20 February 2006, by Zhu Moqing**—The 11 members of the China Antarctic Expedition team accomplished their mission to the Grove Mountains, 460km from Zhongshan station, and returned to base yesterday. During the 58-day expedition, they collected a record 5,354 meteorite samples. ❑

Row Around Antarctica Sunk Just Ten Miles In

***[London] Times*, 20 February 2006, by Joanna Bale**—A British oarsman admitted defeat yesterday after a failed second bid to become the first to row solo around Antarctica. Colin Yeates, 47, expected his 11,300-mile journey to take more than ten months. The landscape gardener set off from the Falklands last month, but ran aground after just 30 hours and 10 miles at sea. Rescued by farmers, he set out again on Thursday. But in just 39 hours at sea he capsized five times. He was rescued by a Falklands patrol boat after setting off an emergency beacon. His wife, with whom he has five daughters and two sons, aged 6 to 29, declined comment. ❑

Parachuting Krill Sequester Carbon

***Cell Press*, 6 February 2006**—Krill parachute into the deeper layers of the ocean many times a night and sequester large amounts of carbon in the process. Like many other small pelagic animals, krill perform daily vertical migration (DVM), in which they eat in the upper ocean layers at night and hide in the deeper layers by day. Previous research has shown that this behavior may be a rapid means of transporting carbon to the ocean's depths. However, the amount sequestered was not considered to be large because it was assumed that DVM happened just once every 24 hours. In fact, krill are capable of many migrations each night, and the downward migration may be particularly rapid as the krill fan out their swimming legs and enter a controlled descent akin to parachuting. It is estimated that Antarctic krill each year sequester the equivalent of the annual carbon emissions of 35 million cars. (*Current Biology*, 7 February 2006) ❑

Gjeldnes' Record Crossing

***ThePoles.com*, 3 February 2006**—Rune Gjeldnes is not a man of big words, the reason perhaps why this Norwegian has been such a dark horse in the polar hall of fame. Today, he ended his 4804km solo kite ride across Antarctica, from Novolazarevskaya in Queen Maud Land to Terra Nova in Victoria Land, without resupplies and in 90 days, 20 days sooner than he expected. Gjeldnes is now the only person to have traversed both polar ice caps without resupplies. In 1996, he kited across Greenland, the longest way: 2895km south to north. In 2000, he crossed the Arctic unsupported. ❑

Japanese May Have Oldest Ice

***Japan Times*, 26 January 2006**—Japanese researchers have collected what they believe are the oldest samples of ice ever taken—possibly dating back 1 million years. The core was drilled from a depth of 3,028.52m near Dome Fuji station. The oldest sample previously collected from Antarctica, by European Union scientists at Dome C, was 800,000 years old. ❑

Australia to Downsize Macquarie Base

***[Hobart] Mercury*, 11 January 2006, by Sue Neales**—Australia's base on Macquarie Island is to be virtually abandoned. Only a small corps of meteorologists will remain on the island after mid-2007. Australian Antarctic Division chief scientist Michael Stoddart said yesterday the division had decided to concentrate its major sub-Antarctic research efforts on Heard Island. About 20 scientists usually spend all year at Macquarie Island, located 1500km southeast of Tasmania, with more than 40 summering. There has been a scientific base on

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Major Milestone Reached At Pole

El Station Achieves 100% Conditional Occupancy

by Jeff Rubin, Antarctic Editor

Builders of the new Elevated Station at the South Pole achieved a major milestone this past Antarctic summer when their work passed inspections and conditional occupancy of the entire station was approved on 29 January 2006.

Conditional occupancy is awarded only after rigorous inspections are conducted by the project design team engineers, representing the U.S. Government.

The inspections must confirm that construction has been completed per the approved drawings; that all fire, life and safety codes have been met; and that the related infrastructure systems function as designed and/or to manufacturer specifications.

NSF/USAP PHOTO BY SCOT JACKSON

***TRANSITION COMPLETED:** Aerial view over the South Pole on 2 January 2006 showing the old Dome at middle left and new Elevated Station at middle right*

8 Down, 0 To Go

Along with the conditional occupancy of the final three of the station's eight wings—A4 (Summer Housing), B3 (Administration & Communications) and B4 (Multipurpose)—that was approved, conditional occupancy of the Dark Sector Laboratory was also approved.

This allowed the Dark Sector Lab's first science tenant, BICEP (Background Imaging of Cosmic Extragalactic Polarization, designed to measure the polarization of the cosmic microwave background with great precision, thus answering questions about the beginnings of the universe), to begin making observations this austral winter as planned.

NSF/USAP PHOTO BY JERRY MARTY

***NEW HOME AT 90°S:** The Elevated Station, awarded 100% conditional occupancy on 29 January 2006, showing Pod A with siding partially installed and work on lower angle panels—which channel wind-blown snow beneath the structure—in progress*

Dome: Cold, Dark—and Soon, Gone

With the transition of all station activities to the Elevated Station, all buildings under the Dome are now cold and dark. This austral winter, the old Comms/Administration building, the remaining berthing and the old Science building are being demolished.

"At the end of the winter," says construction project manager Jerry Marty, "the Dome will be empty."

Skylab, now also dark and cold, will be demolished at the same time the Dome is removed.

With the elevated station fully occupied, all eight wings are integrated into a whole system for the first time, Marty says: "We now have a completed city, and we can understand issues of overall efficiencies and assure that all the systems are talking to each other correctly."

Siding Side-Tracked

Now that the El Station is a complete unit, however, two new engineering and facility-operations challenges have become evident, Marty says.

The installation of the station's exterior cladding, or siding, was put on hold this past austral summer when managers noted an unhappy trend.

"As we were looking at fuel consumption, some of the numbers were more excessive than projected," Marty says. "We found that there was some heat loss from the elevated station."

Using an infrared camera and personnel from the Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, N.H. who were already planning to be at McMurdo, "we

NSF/USAP PHOTO

***HOT SPOT:** Chamfer panel removed from El Station roof perimeter, showing areas of heat loss that are being remediated with sealant*

were able to see areas where we were losing heat," Marty says.

"We didn't get as much of the siding done as we wanted," he adds.

Less than 10% of the siding—which will cover the entire station's roof, sides, and underside, for a total of some 12,350m²—was finished, with only Pod A's horizontal upwind face, part of its angle sections and all of the section next to the Vertical Circulation Tower, a.k.a. the "Beer Can," complete.

Sealing Leaky Joints

To eliminate the greatest heat loss, which occurs "at the top of the wall, primarily along the roof perimeter," Marty says, "we are putting on a sealant, a very sticky material. The trick is that you have to have the sealant somewhat pliable, which means heating it up." The warmed sealant must be applied rapidly before it cools and hardens.

As many as 25-50% of the chamfer panels, which are made of expanded polystyrene foam and run along the edge of the roof, will need to be removed temporarily so the sealant can be applied.

"At the end of the winter," Marty says, "the Dome will be empty."

The heat loss occurs mainly where panels abut one another and where panels meet the structural steel framing.

Tyvek's Toughest Task

In another effort to stop heat loss, the builders also decided to cover the El Station exterior with a protective envelope of Tyvek housewrap, whose advertising slogan is "As important to a home as insulation."

While Tyvek is used on millions of homes, in all likelihood this is its toughest assignment anywhere.

The wrap blocks air infiltration and is put on before the siding is installed.

Drift: a 'Controlled Experiment'

Construction crews also were only able to finish the lower angle sections—designed to channel wind-blown snow beneath the station—on Pod A.

"This means that we have an opportunity now for the engineeers to check the situation with snowdrifting in a controlled experiment, since Pod B will not have the angle section this winter," Marty says.

Power Plant Modifications Needed

Meanwhile, engineers have determined that the station power plant needs to be modified for energy conservation and maximization of the generators.

That work will be also begin in late 2006, Marty says.

Additional analysis is being performed to learn how well the power plant will be able to meet the increasing demands of new science projects, and further modifications may be necessary.

Dedication Being Discussed

"It would've been nice not to have this in front of us," admits Marty, "but it's important to find it out now. With any system like this that has to be integrated over 10 construction seasons, it's not uncommon to find things that need to be re-addressed, especially when you look at a system where all the facilities are working together for the first time."

Because the heat loss along the perimeter of the roof line has necessitated remediation work, the official station dedication may be delayed.

"Station dedication is still being discussed until we can confirm the priorities for FY 07 summer" (which begins in the fourth quarter of 2006), says Marty.

NSF Office of Polar Program senior managers should have these priorities set by August 2006.

Dueling Priorities

Two major South Pole science projects most likely will compete with El Station construction for flight time and budget resources next austral summer.

The IceCube neutrino-observatory project, which successfully drilled eight new holes and placed eight strings of photomultipliers last season, has set a goal of completing at least 12 holes and strings and as many as 14 during this coming austral summer.

The 10m South Pole Telescope, meanwhile, is being test-assembled in Kilgore, Texas and should be ready for construction at Pole this upcoming summer season.

Completion Plan

Current plans for upcoming El Station work, Marty says, include:

FY 07—finish siding; achieve conditional occupancy on new cryogenic facility (storage of liquid helium and nitrogen) and new Rodwell Number 3 (station water source); commence major work on logistics/warehouse arch facility, including demo of interior buildings: old power plant, old gym and old garage-shop

FY 08—conditional occupancy of logistics/warehouse arch facility

FY 09—Dome disassembly; Skylab demo; final site remediation and retrograde of materials; project closeout.

"We can now see the finish line on this marathon run," says Marty. "We've turned the corner, and now we can actually see the finish line out in front of us—but we're not there yet." ❑

Tourist Asked to Return 'Souvenirs'

***Lufkin Daily News*, 12 March 2006, by Hina Alam**—Ross Thomas, a retired school teacher who visited Antarctica last December, said he's learned his lesson.

Thomas made a comment during a *Lufkin Daily News* interview in February about picking up a rock and penguin feathers during his Antarctica visit.

Tourists were not allowed to pick up anything, explained Thomas. "There are strict rules about picking up penguin feathers or rocks." Having said that, Thomas chuckled. "But I did manage to get a golf-ball sized rock as well as penguin feathers from there." The rock was now part of his son's water-rock garden.

The International Association of Antarctica Tour Operators (IAATO) responded with horror.

In an e-mail, Tomas Mariano Holik, operations manager for the tour company with which Thomas traveled to Antarctica, sent the following message:

"It is with surprise and disbelief that I read the article published in the *Lufkin News* on February 19, 2006, in which you describe your Christmas trip to Antarctica on board our vessel the *MS Nordnorge* and collection of a golf-ball size rock and penguin feathers.

"On board our vessels we do put a special emphasis on the IAATO guidelines...you have disregarded the instructions given to you on board our vessel, which were adhered to by your fellow passengers...There are more than 20,000 passengers visiting Antarctica each season. If each one of them collects a rock from the same beach as you did, in a very short time said beach will suffer a substantial change, change that will affect in the long term the landscape of the area as well as potentially the habits of the species that breed in the vicinity."

Holik then offered to "repatriate" the rock and feathers to Antarctica "free of charge for you," adding that "in order to be deposited in the same landing site from which you collected them, we would need to know from which landing site you collected said rock and we will make sure the *MS Nordnorge* brings it back during the 2006-07 season."

Thomas has complied. "I sent back whatever feathers I had and the golf-ball sized rock on March 8," he said.

They will now be returned to the "correct geographical location," Holik said.

If the U.S. government should choose to take action, added Denise Landau, executive director for IAATO, under U.S. law the penalties for unauthorized collecting in Antarctica could be a $25,000 fine or imprisonment. ❑

Undergrads on Ice

by April Jacobs and Liz Miller

Courtesy of April Jacobs and Liz Miller

FIELD WORK AND FROSTY BOY: April Jacobs, on right, and Liz Miller flank their advisor Dr. Berry Lyons in Wright Valley

Editor's Note: April Jacobs and Liz Miller, senior geological sciences majors at Ohio State University as well as student workers at the Byrd Polar Research Center, where director Berry Lyons praised their "tremendous" diligence, spent nearly two months (22 December to 15 February) working in Antarctica.

After five planes, four days, and almost 25 hours of flying, we reached the bottom of the world. It was 22 December 2005, and, bundled up in all of our cold weather gear, we waited anxiously inside the C-17 that had finally delivered us to Antarctica after a five-hour flight from Christchurch. It was our first time to "The Ice," and we were both excited to deplane.

It's impossible to prepare for your first step out of the plane. The first breath of cold air stings your lungs, and if you don't get goose bumps from looking at the snow and ice that surrounds you, you at least get them from the wind whipping across the ice shelf.

The first week in McMurdo was hectic: Outdoor Safety and Waste Lectures, Field Safety Training ("Happy Camper") School, and getting settled in to our rooms all took some time, not to mention learning our way around and meeting all kinds of new people!

We were roommates, and our room consisted of two beds, two armoires, a TV, a sink, and a shared bathroom. The galley was a close walk, and the food was usually pretty good, with meat and vegetarian options at every meal, and occasional "freshies" like salad and fruit. Even if the meal was unappealing, there was always "Frosty Boy," the vanilla soft serve "ice cream" rumored to only have five ingredients, none of them dairy.

We both worked as lab assistants in the Crary Laboratory for the Long Term Ecological Research (LTER) program, analyzing samples from a variety of sites in the Dry Valleys. Liz ran phosphate analyses on Antarctic water samples and chlorophyll analyses of soil samples. April ran the ion chromatography instrument, analyzing water samples for major anions and cations.

McMurdo life was great: there were tons of unique and interesting people to hang out with, three bars and even a bowling alley for entertainment.

But life in McMurdo was nothing compared to life in the field. There, everyone is either working or sleeping, but mostly working. We experienced this level of dedication firsthand when we left for Taylor Valley, one of the Dry Valleys, on 10 January. Taylor Valley is beautiful: white glaciers cresting majestic mountains, snow-covered lakes with sky-blue icy moats. For the first time, we saw the place where all of those samples had come from.

As we flew into Taylor Valley, we were flashing pictures left and right, our eyes wide and smiles from ear to ear. Back home we had been working with data from the very lakes we were flying over!

Our first stop was Lake Hoare. There's only one main building (about 24'X10') which has a kitchen, a camp business office, craft table, lounging area and computer lab. It was pretty intriguing that we could get along with very little space, very few personal items and still have a tremendous amount of fun and comfort!

We each slept in our own tent, our only real bit of privacy. We both slept better at Lake Hoare than we ever did back in McMurdo. After a full day of field work, a comfortable down sleeping bag in the warmth of a tent was the perfect place to lay your head.

In both Taylor and Wright Valleys, numerous extinct volcanic cones punctuate the landscape. Their deep blackish-red color makes them stand out against the surrounding brown and white. For her senior honors thesis, Liz looked at the rate of weathering of the cones. The ages of the cones are very well constrained (between 1.5 and 4 million years old), so a qualitative study can be performed to estimate the rate of weathering.

Each day, we and our advisor Dr. Berry Lyons were picked up at Lake Hoare by one of the helicopter pilots and flown to an area where Liz could collect rock samples. We loved being out hiking around in the field, although hiking from volcanic cone to volcanic cone did prove to be rough sometimes.

Due to the lack of vegetation, deciphering distances in Antarctica can be quite difficult. Sometimes we would hike and hike, look at our watches, sigh, and turn around so we were sure to be back in time to catch the helicopter back to camp.

Rae, the camp manager, always had great meals cooking, perfect for re-energizing after a day of fieldwork. The homemade meals were always delicious, and totally made up for the Asian-food-nights back "in town," when we survived on just bread and Frosty Boy.

After three days of rock collecting and re-

cording, the two of us headed to F6, an even more remote field camp located next to Von Guerard Stream, a glacial meltwater stream near Lake Fryxell. Here we assisted Karen Cozzetto, a Ph.D. student from Colorado working on the LTER project, in her stream tracer experiment, a.k.a. the mother of all stream experiments! It was unbelievable how many different types of data were taken for this one experime: water temperature at depth, weather data, stream samples (for a myriad of data), all taken at five different sites simultaneously over about 18 hours.

We spent two full days just setting up the equipment. April worked on getting the right number of bottles to the different sites and Liz helped to set up and wire the thermocouples. Our goal was to collect as much data as possible to understand the flow dynamics and chemical interactions of the stream and the streambed.

On Field Day 7—completely exhausted and still unshowered, our "field hair" greasy beyond belief—we returned to McMurdo.

It was definitely a bit weird. For the first time, the crowd of people in the galley at dinner wasn't appealing. Perfumes and fragrances were noticeable to the point of annoyance.

"So how was it?" several McMurdo buddies asked. But it was difficult to put into words—and sometimes still is.

Liz (hometown: Maineville, Ohio) will begin pursuing a Ph.D. at Johns Hopkins University and is returning to Antarctica in December ("I can't wait!" she says). Antarctica "definitely exceeded all expectations" for her.

Working in the field, she says, was by far the best part of the trip: "There's so much work to be done, collecting rock samples, describing the landscape, taking GPS points. There's nothing more satisfying."

> *Exhausted and still unshowered, our "field hair" greasy beyond belief, we returned to McMurdo.*

A helo ride to Garwood Valley was another highlight. "It was a day trip to help with some CO^2 flux sampling, and we were flying out in an A-star, one of the smaller helos. Flying 50 feet above the ground, swaying back and forth as you zoom up a streambed, then quickly shooting up to 200 feet before plummeting back down to land, was the best ride of my life!"

Says Liz: "It sounds clichéd to say that my trip to Antarctica was a life-changing experience, but it really was. I was given the chance of a lifetime, and it was absolutely amazing."

April (hometown: Bellefontaine, Ohio), who is currently job-hunting, is interested in doing field work with "almost any research team." In the longer term, she plans on educating the public about environmental issues and general science education.

She was equally affected by their southern journey. "Though I was well prepared and had been shown numerous pictures by my colleagues, I was awestruck and speechless as I stepped off the plane," she recalls. "I nearly started to cry. As a young girl, I had often imagined myself taking amazing adventures for the sake of science and discovery."

She was likewise thrilled by their fieldwork at F6. "I was tickled to be doing "real" science," she says. "I felt like I was taking part in a legacy, a world-changing (at least, textbook-changing) project. I was put in charge of organizing one part of the experiment and that just put me on top of the world."

Smells and sounds—or their absence in Antarctica—impressed April. "The only smells I experienced in the field were those made by people: clean people, dirty people, sunscreened people, people making food. And the quiet was hard to imagine, even now. It was so peaceful. I slept like a baby.

"And for the first time, I caught a glimpse of what it would have been like to be an explorer, driven solely by adventure and discovery of unknown places."

To read more and see photos of the women's adventure, visit www.lizsadventures.blogspot.com/ and www.flickr.com/photos/iceflicks. ❑

Antarctic Notes

(CONTINUED FROM PAGE 25)

Macquarie—nicknamed "Macca"—for more than 50 years. ❑

Asbestos Cause of Macquarie Pullout

***[Hobart] Mercury*, 12 January 2006, by Anne Mather**—Scientists are concerned that a plan to abandon research at Macquarie Island is based on budget pressures exacerbated by asbestos contamination, which could cost tens of millions to remediate. Up to half the buildings on Macquarie contain asbestos; the Antarctic Division is under pressure to eradicate the material in accordance with national guidelines. Scientists say budget cuts are the real reason behind the move. The Antarctic Division yesterday said no firm decision had been made on the base's future. Chief scientist Michael Stoddart said discussions were ongoing, adding that whatever decision was reached it would be made "on the basis of scientific research." He denied that budget constraints were behind the plans. ❑

2005 Ties for 2nd Warmest Year

***University of Alabama Huntsville (UAH)* press release, 5 January 2006**—With a global average temperature that was 0.3°C warmer than seasonal norms, 2005 tied with 2002 as the second warmest year in the past 27, according to data gathered by NOAA satellites and processed at UAH. Temperatures in 2005 followed a general pattern seen over the past 27 years, with the most significant warming seen in Earth's northernmost third, especially in the Arctic. "It just doesn't look like global warming is very global," said Dr. John Christy, director of UAH's Earth System Science Center. "Even if you acknowledge the effects of greenhouse gases, when you look at this pattern of warming you have to say there must also be something else at work here." ❑

India Plans Third Station

***http://in.rediff.com*, 26 December 2005**—A site at 69°S, 76°E in East Antarctica's Larsemann Hills has been selected by the Department of Ocean Development for the site of India's third permanent station. "At this stage, it is not possible to give a time frame for setting up of the third station," sources at the Ocean Development Department said. ❑

New Map of Tides Beneath Ice Shelves

***Ohio State University* press release, 5 December 2005, by Pam Frost Gorder**—Using the twin satellites of the Gravity Recovery and Climate Experiment (GRACE), scientists have used minute fluctuations in gravity to produce the best map yet of ocean tides that flow along the ocean floor beneath the Larsen and Filchner-Ronne Ice Shelves. While the tides cause only minute fluctuations in Earth's overall gravity, they are actually composed of massive amounts of water, said C.K. Shum, professor of civil and environmental engineering and geodetic science at Ohio State. The ice is a mile thick in parts, and the tides are so large that they can lift the shelves—with a combined area bigger than California—as high as 15 feet. ❑

ICE HOUSE

NICL Safeguards Ice Cores for Science

Lab Set to Play Major New Role at West Antarctic Drilling Site

by Jeff Rubin, Antarctic Editor

© Jeff Rubin

IN 'THE BOX': Todd Hinkley, NICL's technical director, at left, and Geoff Hargreaves, the lab's curator, in Main Storage, chilled to –33°F to protect the cores, which total nearly 10 miles in length. The earliest-drilled cores were collected at Little America V during the IGY.

To visit one of the world's most unique and important repositories, call well in advance for an appointment, then stop briefly at the guardhouse of the Denver Federal Center and follow the signs to the enormous Building 810.

At Door S25 is NICL, the U.S. National Ice Core Laboratory (pronounced "Nickel"), cold store for 15,000 ice cores drilled from the depths of ice sheets in Antarctica, Greenland and North America over the past 50 years.

Pull on a bulky Refrigiwear or Polar King suit, slip your feet into oversize "bunny boots," and let Todd Hinkley, NICL's technical director, and Geoff Hargreaves, the lab's curator, lead you into "the box," the immense freezer where the cores—totalling nearly 10 miles in length—lie in wait for researchers' future discoveries.

As you step through the massive commercial-grade freezer door into Main Storage, you notice two things immediately: the –33°F chill and the bright glitter of thousands of shiny storage tubes lying in rows on open racks rising ten feet from the floor.

That faint whiff of something hard to name—Juicy Fruit gum? banana? nail polish remover?—is butyl acetate, a drilling fluid used at some sites. If you were to cut a section from, say, a Siple Dome core, Hinkley says, "the smell would just knock you over."

World Leader

NICL's collection of ice cores is the largest in the world. This extraordinary archive yields a long-term, unbroken record of material deposited by the earth's atmosphere and captured in falling snow that turned to ice. It's invaluable for the study of global climate and past environmental conditions.

"NICL is phenomenal, a tremendous resource, a world-class facility with great people—the professionalism, the quality, and the security are without peer," says Richard B. Alley, author of *The Two-Mile Time Machine: Ice Cores, Abrupt Climate Change, and Our Future* (2000) and Evan Pugh Professor in the Department of Geosciences, and Earth and Environmental Systems Institute, at Penn State University.

Scientists from around the globe seek access to NICL's ice. The 8,000-square-foot lab is operated jointly by the U.S. Geological Survey and the National Science Foundation, while the University of New Hampshire manages the many requests for samples.

Cores here have been collected from 100 different bore holes, primarily in Greenland (including such drilling sites as Camp Century, Crete, Dye-2, Dye-3, GISP 2, Humboldt, Milcent, Site A and TUNU) and Antarctica (including Bentley Shot Hole 3, Byrd, Dominion Range, Newall Glacier, RIDS-A, Siple Dome, South Pole, Taylor Dome, Upstream-C, Vostok and Windless Bight).

The earliest-drilled cores were collected at Little America V in Antarctica during the IGY of 1957-58.

"NICL is a fantastic resource that allows today's scientists to access the ice collected in previous projects and then build on the previous work," says Kendrick C. Taylor, who was chief scientist for the Siple Dome ice core project from 1995 to 2000 and is Research Professor with the Division of Hydrologic Sciences at the Desert Research Institute in Reno, Nevada. "It makes it a lot simpler for new investigators to break into the field because they can access so much ice with so little effort."

Fighting the Telltale Divot

The cardboard ice core tubes are one meter long (older tubes are 1.5m long), with aluminized exteriors to reflect any sunlight that might fall on them at the drilling site. The tubes' shiny material also makes them easier to spot as they lie in the snow.

Within the tube, the cores are kept in long plastic sleeves either sealed or stapled shut to prevent loss of ice to sublimation, the same process responsible for the shrinking and rounded corners on ice cubes left in a home freezer for a long while. Even a tiny pinhole in the plastic sleeve, undetected for a couple of years, will leave a divot in the adjacent ice. In a tightly-sealed sleeve, corners on a piece of ice remain sharp for many years.

Sleeves are labeled with the drillhole, tube number, top depth (TD), bottom depth (BD), and up/down orientation, which is, of course, critical for determining the dates of annual lay-

ers. Thanks to differing hoarfrost effects and varying contents of acids and dusts, annual layers of snowfall (now turned to ice) are often visible: white for summer, clear for winter.

For each core, the NICL database (http://nicl.usgs.gov/) gives location, drilling history, cutting history, distributions of samples, and amount of core remaining in the collection.

Enjoying 'Field Work' in Denver

NICL is no mere repository for ice cores, however. It also has facilities that allow researchers to work on-site.

For processing, a core is taken from Main Storage into the Exam Room, where the air is kept at a more comfortable –15°F. The core is left undisturbed there overnight to permit equilibration to the warmer temperature, avoiding thermal shock.

A small piece, or "slab," is cut parallel to the core's axis using a horizontal woodworking bandsaw. The exposed surface is planed with a wood planer to allow for "visual stratigraphy," or visual inspection and logging. Electroconductivity measurements can also be performed on the smooth surface, revealing annual layering.

Sensitive sampling can be done in an adjacent Class-100 filtered-air clean room (containing a maximum of 100 microscopic particles 0.5 microns or larger in each cubic foot of air, compared to as many as one milllion such particles per cubic foot in an average office) also kept at –15°F.

"NICL offers an excellent opportunity for many scientists to come together for a continental U.S. field program," says Ellen Mosley-Thompson, Senior Research Scientist at the Byrd Polar Research Center and Professor in the Department of Geography at Ohio State University. "The cores are inspected, analyzed, and sectioned as a collective effort. This mimics earlier field programs where large snow trenches contained numerous areas for initial observations and conducting analyses. Now only time-sensitive observations and those analyses critical to determine a rough time scale for the core need to be made in the field. The majority of the scientists can enjoy their 'field work' in Denver."

Preventing a $100,000,000 Puddle

The nightmarish thought of their collection turning into a $100,000,000 puddle leaves the ice curators dreading a midnight call.

NICL's freon refrigeration system uses redundant compressors that spell one another on a timed schedule. Fans operate continuously to prevent temperature stratification of air in the freezer, and a natural gas backup generator provides additional security.

In the event of a loss of power, the NICL building's insulation would slow warming to 5-7° F. over an eight-hour period, Hargreaves says.

Beyond moving the cores elsewhere in refrigerated trucks, Hinkley says that in case of a catastrophe, "we could order a truck of liquified carbon dioxide and squirt it through holes in the wall. But we really wouldn't like to do that because the measurement of carbon dioxide in the ice is one of the most important parameters that we are involved with."

NICL's gas and electricity bill is $45,000 a year. Because NICL is inside Building 810, the monthly temperature variation isn't as great as it would be if the lab were refrigerating against the outdoor environment. Still, Building 810's interior gets warmer in the summer than in the winter. Temperature variations could be mitigated or minimized by painting the building's roof white, or by ventilating at night in the summer, ideas that are being proposed to NICL's landlord, the General Services Administration.

The Long Road to NICL

Extracting ice from deep boreholes is a specialized art, and handling sections of core from the "brittle zone," approximately 400 to 1500 meters deep, is particularly tricky. Sometimes, Hinkley says, a core "comes up looking like a bag of dice." The brittleness is related to the compression and disappearance of the atmospheric gas bubbles into "clathrate" form. To minimize shattering, cores from the brittle zone are left in a sub-ice dugout chamber at the drill site to "relax" for up to several years before transport.

All ice reaches NICL only after a remarkable journey.

Antarctic cores are flown from the deep field to McMurdo Station on an unheated "cold deck" flight (only the cockpit is heated). Due to the high cost and extensive effort required to obtain the cores, they're given top-priority handling—only an urgent medevac flight takes precedence over ice core flights.

Upon arrival at McMurdo, the pallets holding core boxes are loaded into a dedicated "ice-core-only" vehicle at the airfield. Leaving McMurdo, they ride in a shipboard freezer on the 8,300-mile voyage to Port Hueneme, California.

From the port, they're shipped by refrigerator truck to NICL, an 1100-mile trip. An empty refrigerator truck follows the ice-core truck the whole way: "We're just anticipating the possibility of a breakdown on a July afternoon right around St. George, Utah," Hinkley says.

An "Unhappy Condition"

The careful transport of cores is usually flawless—but not always.

Someone at McMurdo, remembers Ellen Mosley-Thompson, once ran over some ice core boxes with a large tracked vehicle.

In early 1985, one hundred meters of core from Antarctica's Ice Stream B arrived back in the U.S. in what Richard Alley, then working on his Ph.D., remembers as an "unhappy condition." The freezer on the ship broke and was

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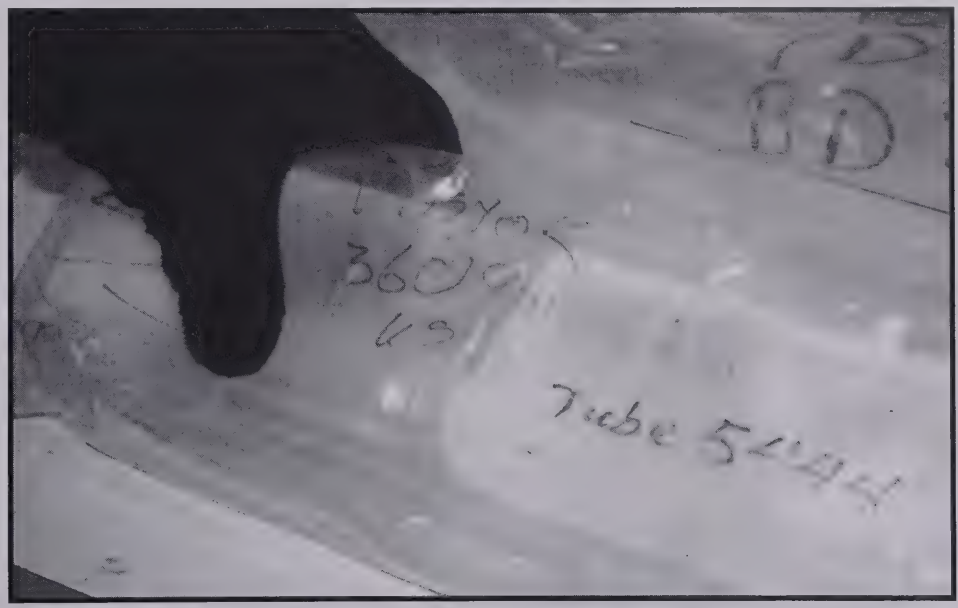

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CELEBRATED ICE: Geoff Hargreaves holds a section of the Vostok ice core in its protective sleeve, sealed shut to prevent sublimation

KEEP FROZEN

PREVENTING NIGHTMARISH PUDDLES: Cores are given top-priority handling en route from drill site to NICL, and again when outbound to researchers

not fixed rapidly. "Where there should have been beautiful cylinders of firn and ice," Alley says, "there were puddles of refrozen meltwater in the bottoms of the plastic bags in the core tubes. Some had little bits of firn 'floating' in the refrozen water. NOT a happy time."

To avoid another such loss, temperature checks on the shipboard freezer are now done four times a day, and a detailed log of each core shipment's journey is kept throughout the entire trip from the drilling site to NICL and archived upon arrival.

Slabs Shipped Worldwide

NICL sends samples to scientists around the world, using either urethane foam-insulated cardboard shipping containers or containers with vacuum-insulated side panels, the latter used for more critical or longer-distance shipments. Inside the shipping container with the ice core are miniature temperature loggers and eutectic bags, similar to the blue ice packs sold in fishing stores. Before shipping, the open containers are cold-soaked overnight in Main Storage.

Commercial courier services like FedEx are routinely used, though Hinkley adds, "we try to stay away from weekends and around Christmas."

Overseas Counterparts

NICL was dedicated in August 1993. Its first holdings came by truck from its predecessor at SUNY Buffalo in New York, where the facility's freezer was small and 80% of the cores were kept off-site in a nearby commercial freezer.

Few other countries have a counterpart to NICL. Denmark and Japan have their own facilities, while India is building its own ice core lab in Goa. Japan owns temporary bragging rights, since one of its freezers is maintained at -58°F. But Montana State University was recently awarded $1.8 million in grants for a Subzero Research Facility whose coldest room will drop to -80°F. The colder ice is kept, the slower the migration of gas molecules out of the ice, making it more valuable for very sensitive measurements.

Argentina, Australia, China, France, Germany and the U.K. also have national collections of cores.

Core caretakers debate the relative value of different storage methods. Most countries use commercial freezer facilities rather than their own dedicated space. Hinkley, who once worked at an ice cream factory in his youth, explains their rationale: "The company doesn't want to lose its frozen chicken, so they think their ice core is safe."

Denmark and the U.K. further protect their ice by storing it inside insulated boxes within the freezer.

> *"We're just anticipating the possibility of a breakdown on a July afternoon right around St. George, Utah."*

The best place to preserve ice is central Antarctica. Partly for this reason, some of the world's most celebrated core, the Vostok ice, is kept at its namesake Russian station, where the lowest temperature on Earth, -129°F, was recorded in 1983. Five vaults at Vostok, two at the surface and three beneath the snow, maintain cores at a mean annual temperature of -67°F.

New Hole, New Role for NICL

Peer down NICL's long aisles of shining tubes and you'll eventually spot an entire row of empty shelves. Another row of shelves has not even been built yet.

The extra capacity is needed to accommodate another 3,800 tubes of core that will begin coming out from the West Antarctic Ice Sheet (WAIS) Divide in 2007-08.

The $10 million WAIS Divide project (http://waisdivide.unh.edu/) completed its first season in February, setting up the camp building and bringing some equipment to the site. The project's new drill will be tested in Greenland in summer 2006 and then taken south and set up in austral summer 2006-07. Drilling is expected to begin the following year.

The goal is to pull a stick of ice 3,500 meters long from the Antarctic ice sheet at 79.467°S, 112.086°W, about 1,000 miles from McMurdo. The drillers hope to reach bedrock by 2010 or 2011.

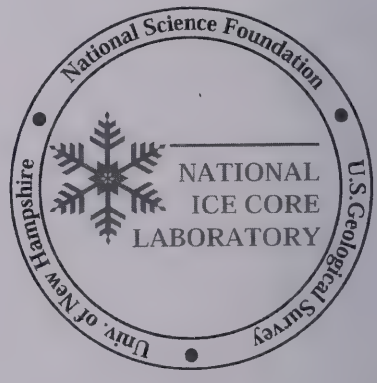
WAIS Divide promises to be one of the major Antarctic research projects of the next decade—and NICL staff will be playing a new role for the first time, leaving their Ice House in Denver to work at the 60-person WAIS Divide field camp.

"NICL will be responsible for handling the core from the moment it comes out of the drill," says Kendrick Taylor, chief scientist for the WAIS Divide project. "They are responsible for designing, building and operating all the equipment used in the field to handle, cut and pack the core. Whenever we are drilling, they will have one or two people on site who will supervise the six to eight core handlers who cut and pack the core."

Because the WAIS Divide site is a high snow accumulation zone, annual layers will be detectable (1 cm thick) to at least 40,000 years, allowing the ice to be dated more precisely than previous Antarctic cores. This should allow scientists to study interactions between climate variations and atmospheric composition with a level of detail previously not possible in deep long Antarctic ice cores.

After receiving the new core from WAIS Divide, however, NICL will have room for just one more deep core, or several shallow cores. At that point, Main Storage will be full.

Possible solutions to accommodate future acquisitions include constructing additional refrigerated space adjacent to the present facility, or de-accessioning cores that currently hold minimal interest for scientists. ❑



CORRECTION

A caption on page 14 of our January 2006 issue erroneously stated that the basketball court in the new Elevated Station at the South Pole is "just a third smaller than NBA regulation size." In fact, the court is about one-third NBA regulation size. ❑

NASA Satellites Yield Best-Ever Antarctic Maps

***www.nasa.gov,* 5 December 2005**— Scientists using satellite data have created the most detailed maps ever produced of Antarctica that reveal unprecedented views of surface features and provide clues to how and why the continent's ice sheets and glaciers are changing.

Researchers can now decipher the intricate history of ice movements in the "Mosaic of Antarctica," which uses images from the Moderate Resolution Imaging Spectrometer onboard NASA's Terra and Aqua satellites. The map is the result of a partnership between NASA's Goddard Space Flight Center, the University of Colorado's National Snow and Ice Data Center (NSIDC) and the University of New Hampshire.

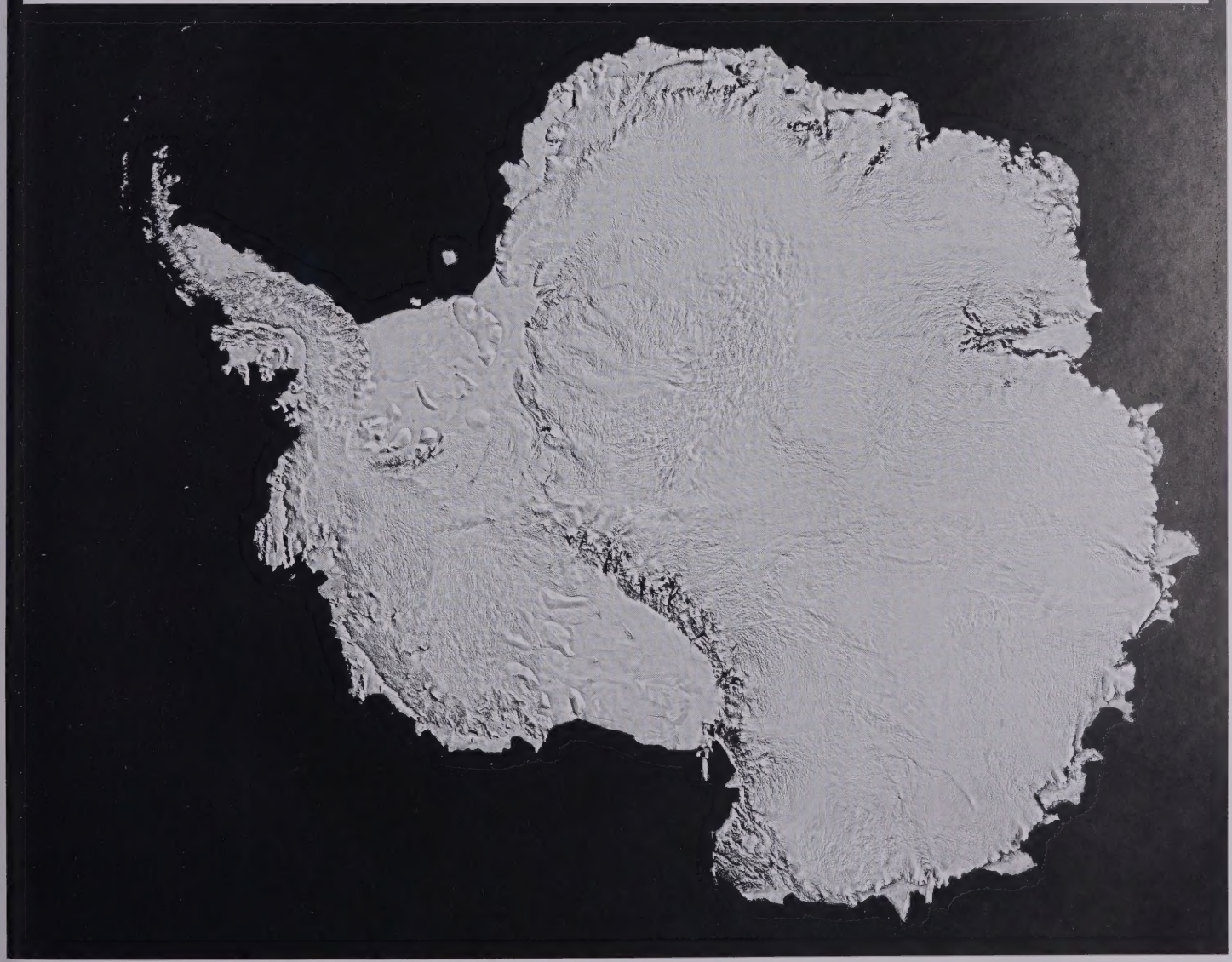
MOA provides a cloud-free view of the ice sheet, ice shelves, and land surfaces at a grid scale of 125 m and an estimated resolution of 150 m. All land areas south of 60° S that are larger than a few hundred meters are included in the mosaic. Also included are several persistent fast ice areas and grounded icebergs.

"The Antarctic Mosaic shows a lot of very subtle changes in the slope of the terrain that you cannot see from the ground," says Robert Bindschadler, chief scientist of Goddard's Hydrospheric and Biospheric Sciences Laboratory. "These subtle variations are important because they tell us the direction the ice is flowing now and they indicate where it has gone in the past. The surface roughness also tells us about the bed underneath the ice and whether the ice is sliding over the bed or frozen to it."

The map will very likely reveal unseen features and new opportunities for exploration, Bindschadler said. "Antarctica is a big place, and there is still an awful lot of the ice sheet that hasn't been explored." The new map will be used by researchers to identify interesting areas and plan expeditions to investigate them.

The Mosaic removes the terrain distortion and produces a more accurate and natural-looking view of the continent and its very subtle surface features. "Using the Mosaic map together with the Canadian satellite, RADARSAT, is a real breakthrough," says Ted Scambos, one of the creators of the Mosaic at NSIDC. "The Mosaic shows the snow and rock surface almost perfectly, and RADARSAT reveals some of the features below the snow. It's very informative." ❑

Visit the Mosaic of Antarctica website: www.nsidc.org/data/moa/index.html



Letter from the Secretary

After nearly 3 years and much dedicated hard work spent for the APS during his off time from cruises in the Antarctic and Arctic, John Splettstoesser decided it was time to hand over the reigns of the APS Presidency to another willing member. The call for ballots in the last issue of PT delivered 200+ votes from the membership. So I located fellow member Bob Dobson to help me officially count and verify the election results, and we would like to announce that Dr. John Behrendt has accepted and is now our new President, Welcome aboard John!

As you may recall from ballot information, Dr. Behrendt is a Fellow at the Institute of Arctic and Alpine Research at the University of Colorado, Boulder and brings many years of experience as a polar researcher to the job. He made his first trip to Antarctica in 1956 as a graduate student, where he wintered over at Ellsworth Station, and has continued his work in Antarctica on 12 additional expeditions, the last in 2003. He also has been a member of the U.S. State Department delegation to 22 Antarctic Treaty Consultative Meetings. So the great leadership continues at APS.

It was a great pleasure to work with John Spletts, although I have not met him face-to-face, I feel I know him well regardless. He certainly has high regard for the Society and he did what he could to make it a bit better. He was always very responsive to any questions, and helped me along in the transition to this job. Thank you Spletts, and good luck on your next endeavors. The other three candidates will move to vice president positions with Dr. Jim Collinson already serving in that capacity, so nothing will change in that regard. They all have fantastic credentials and I hope we will see them on the ballot again, I know it made for a tough choice this go around.

In other news, we are glad to report that a probable place and date for next year's APS Symposium has been chosen. The location is familiar: the Byrd Polar Research Center at Ohio State University. The symposium will likely occur in April 2007, so start making your plans!

Also we are looking for suggestions to get our web page upgraded. We are entertaining every option either through professional or voluntary services.

And as you can expect, things are starting to accelerate with regard to the International Polar Year. National Governments and private organizations are beginning to offer their support so projects are in the planning, and in some cases, in the preliminary stages of research. Because most of you were involved with the last IPY/IGY, I suspect there will be great interest in this from our membership, so if anybody has any suggestions please let us know. ❑

Best Regards

Kevin Bjella

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Obituaries

William Haxby, Mapper of Ocean Floors, Is Dead at 56

***New York Times Online*, 9 January 2006, by Andrew C. Revkin**—William F. Haxby, who created the first maps of the ocean floor to be based on satellite measurements of the water's surface and became a master at translating complicated marine data into comprehensible visual displays, died on Wednesday at his home in Westwood, N.J. He was 56.

Dr. Haxby pioneered the use of complicated marine data collected by satellites to produce ocean floor maps like this three-dimensional view of Monterey Bay in California.

Dr. Haxby, a research scientist at the Lamont-Doherty Earth Observatory at Columbia University since 1978, used computers to sift streams of data from satellites and other sensors and produce images revealing hidden ocean features or phenomena like the drifting of Arctic sea ice.

"Bill peeled back the surface of the ocean for us," said Robin Bell, a colleague at the observatory. "His maps launched countless expeditions and formed the framework for studies of the ocean floor for two decades."

His signal achievement, several ocean scientists said, was the first global "gravity field" map of the world's oceans, created in 1983 using measurements of the height of the sea surface collected five years earlier by a satellite called Seasat that carried a then-new type of downward-pointing radar that could create images. Dimples and humps in the sea, not discernible up close but detectable with satellites, are generated by variations in earth's gravitational field that are created by seabed features like seamounts, chasms and ridges.

Dr. Haxby led a small team that "invented the method to convert millions of arcane satellite observations into quantitative grids and then exquisite images," said David T. Sandwell, a researcher at the Scripps Institution of Oceanography in San Diego.

William Fulton Haxby was born in Minneapolis and studied geophysics at the University of Minnesota and at Cornell and Oxford.

His entire career was spent at Lamont-Doherty, where colleagues often marveled at his ability to turn reams of data into colorful maps and animation that conveyed far more meaning than words or numbers. ❑

Thomas J. Abercrombie

***Washington Post*, 7 April 2006, by Patricia Sullivan**—Thomas J. Abercrombie, a National Geographic magazine photographer and writer who won a lottery to be the first journalist to the South Pole, died April 3 at Johns Hopkins Hospital of complications from open-heart surgery. He was 75.

Shortly after arriving at the magazine in 1956, he was sent from an assignment in Lebanon to Antarctica. Once there, he won a lottery to be the first journalist to the South Pole. The plane froze, and he was stranded in Antarctica for three weeks, prompting a superior to ban further flights "until the weather warms up to -50°."

Abercrombie dived with Jacques Cousteau; suffered typhoid in the Himalayas, where he amputated the frozen toes of a pilgrim as gangrene set in; slipped off his yak in Afghanistan and narrowly escaped plunging into a 1,000-foot chasm; and in Venezuela was knocked off the top of a mountain-climbing cable car and bore the scar to the end of his life.

In 1965, while traveling through Saudi Arabia's "Empty Quarter," his sport-utility vehicle broke down, forcing him to repair the radiator hose with items from his first-aid kit and patch another leak with a poultice of camel dung and barley paste. During the civil war in North Yemen, when paper currency was useless, he had to weld a stash of gold to a vehicle. He then listed two AK-47s on his expense report as "auto insurance."

At the South Pole, "he wanted to take a picture symbolic of the pole that could be taken nowhere else on the planet," said Gilbert M. Grosvenor, chairman of the National Geographic Society. "He made an all-night exposure straight up in the sky, the stars making concentric circles. That picture to this day symbolizes the poles." ❑

John Heap

***Daily Telegraph*, 18 March 2006**—John Heap, who exercised a powerful influence on government policy in Antarctica and, later, the direction of both Arctic and Antarctic research, died at his home in Harston, near Cambridge, on 8 March. He was 74.

As head of the polar regions section of the Foreign and Commonwealth Office from 1975 to 1992, he held one of the very few specialist appointments in the diplomatic service which did not involve overseas posting. Nevertheless he travelled widely as a member or leader of U.K. delegations to all Antarctic Treaty meetings.

He edited successive editions of the Handbook of the Antarctic Treaty System, and also published his Cambridge PhD thesis, *Sea Ice Distribution in the Antarctic* (1962). He described this as a record "worst seller": it sold 11 copies. Although the book provided a valuable record of sea-ice distribution with implications for climate, it was overtaken as a practical aid to navigation by air reconnaissance.

Heap's time as administrator of the British Antarctic Territory from 1989 to 1992 led to his being appointed CMG in 1991, a signal recognition for an officer below the level of head of department or ambassador. He is commemorated in Heap Island, off the Antarctic Peninsula.

In the summer of 1953, he organised and led an undergraduate expedition to the Lyngen Peninsula, east of Tromsø in the Norwegian Arctic.

In 1955 he joined the Falkland Island Dependencies Survey (now the British Antarctic Survey) as a research student at Clare College, Cambridge, to work at the Scott Polar Research Institute (SPRI). For the next seven years Heap conducted sea-ice research in the waters surrounding the British Antarctic Territory.

He sailed in the survey ship *John Biscoe* for the relief of field stations on the Antarctic Peninsula and offlying islands and in Sir Vivian Fuchs's Trans-Antarctic expedition ship *Theron* to the Weddell Sea.

Heap spent two years as a research associate at the University of Michigan, taking part in Operation "Deep Freeze," measuring by tellurometer the movement of the Ross Ice Shelf.

CONTINUED AT RIGHT

Letter from Membership Chair

Greetings from the coast of Maine! I have been gratified to see many membership renewals promptly returned, thus saving the Society extra postage for a second (or third) reminder. Many continue to take advantage of multiple-year memberships with our four-year extended rate. New members continue to come in—some via gift memberships or from being recruited by existing members, others by the Business Reply Card inserts or from our downloaded membership forms from the web site, and even by word of mouth. We continually work on updating our membership rolls with current regular mail and email addresses. You have done a great job of helping us with that endeavor.

For 2006, we have had 27 new members come onboard. We also have two new lifetime members: William Burnham (The Peregrine Fund) and Father Yvan A. Sergy. ❑

Charles H. Lagerbom
Membership Chair, APS

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Obituaries, contd.

In 1964 he joined his SPRI mentor, Dr Brian Roberts, at the FCO. The appointment came at a time of surging international interest following the 1961 Antarctic Treaty, of which Roberts was the chief architect.

The rapport between the two men and Heap's ability to meet Roberts's exacting standards ensured a harmonious working relationship and a smooth transition of responsibility when Roberts retired.

Roberts was a first-class scientist but lacked administrative experience, so Heap was able to take a firm grasp of SPRI's affairs on succeeding as director, from 1992 to 1998, attracting outside funds and expanding the range of its research groups. ❑

Joshua Spillane

***Rocky Mountain News*, 20 April 2006, by Jim Erickson**—The search for a missing marine technician aboard the *RV Laurence M. Gould* was called off Wednesday evening, more than two days after he apparently fell overboard into Antarctic waters en route from Palmer station to Punta Arenas, Chile. Joshua Spillane, 31, of Bellingham, Wash., a 10-year veteran of the Antarctic program who had completed more than 30 cruises, is presumed dead. ❑

Clifford Turner McElroy

by Jim Collinson—Cliff McElroy (March 10, 1925–March 29, 2006), a well-known Australian geologist, participated in the U.S. Antarctic Program as a visiting scientist over three field seasons (1964–1965, 1966–1967, 1980–1981). Two major publications by Cliff and his longtime colleague, G. (Toby) Rose resulted from this work. Miscellaneous Series Map 15, published by the New Zealand Geological Survey in 1987, included a 1:50,000 scale map of the Beacon Heights area of southern Victoria Land and a detailed report in which the stratigraphy of the Beacon Supergroup of this region was described and clarified. A second report, "Coal potential of Antarctica," was published by the Australian Bureau of Mineral Resources, also in 1987. It remains the definitive report on Antarctic coal.

Cliff earned his Ph.D. at the University of Sydney, taught at the University of New South Wales, served as director of the Geological Survey of New South Wales, and established a highly successful and respected consulting company in Sydney. My family and I, and other Antarctic geologists who visited Sydney, were treated to excursions to the Blue Mountains and other areas of beauty and geologic interest by Cliff. He and his wife, Linda, who preceded him in death, were gracious hosts. My thanks to Cliff's colleagues, Toby Rose and John Bryan, and his brother-in-law, David Montgomery, who provided me with far more information than I could include in this short summary of Cliff's productive life. ❑

We have received word of the loss of these APS members: Nathan J. Frank, William Leary, Carlton Molineux (March 2005), Jim Schriner, Gerard R. Seeney (May 2005), Charles H. Vandament (October 2005), and Norman Vaughan (December 2005) ❑

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U.S. $15/yr
Foreign $17/yr
Library/Institution $20/yr

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U.S. $50
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Life Membership Rates
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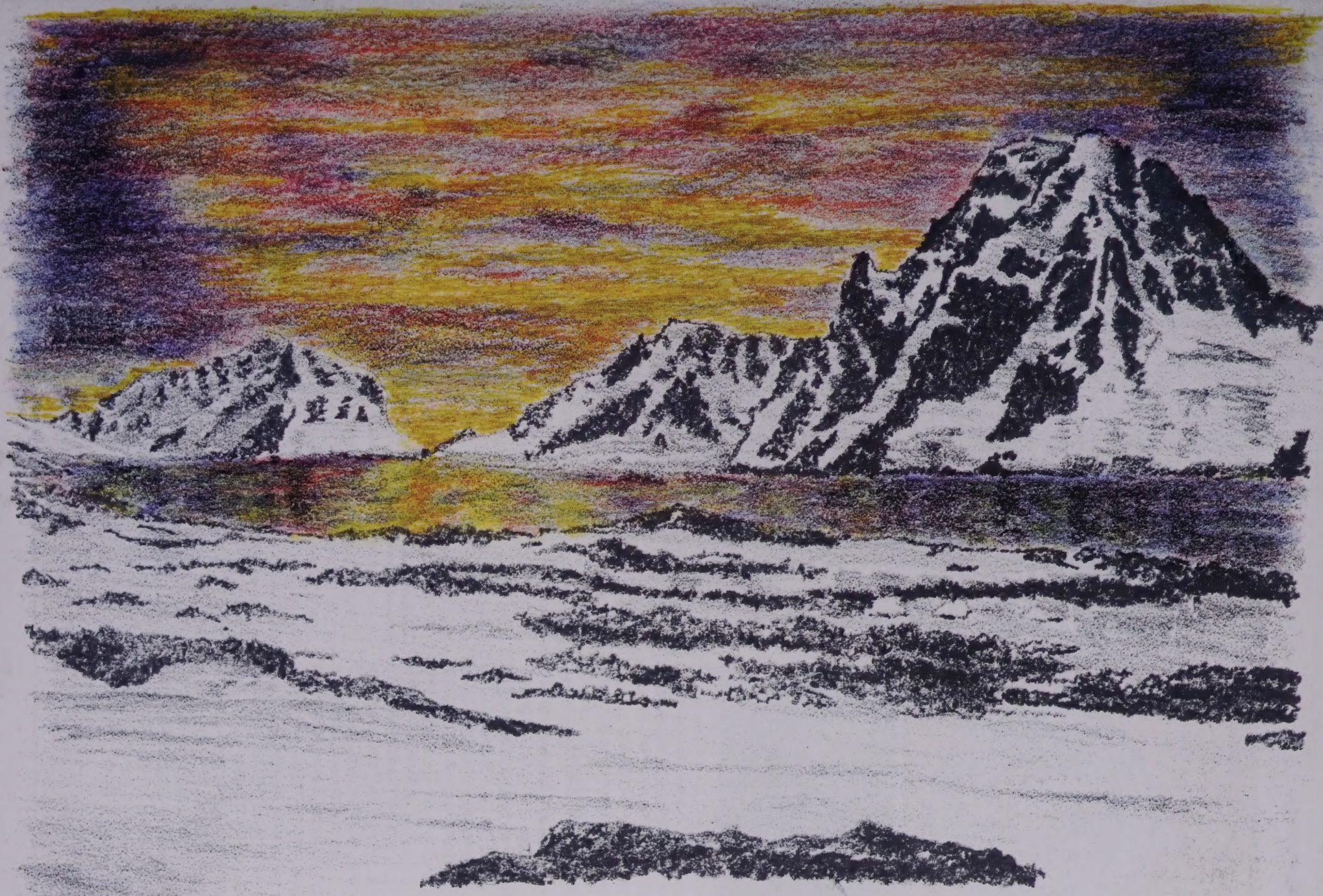
Purpose of APS

"The purpose of the American Polar Society is to bring together people interested in research and exploration in the Arctic and Antarctic; to preserve the record of polar research and exploration; and to support and encourage research and exploration in polar and polar-like regions. Toward these ends, the Society will collect and disseminate information about polar regions; compile written records, oral histories, maps, photographs, film and video, and electronic information relating to polar regions; aid organizers and members of polar expeditions; and maintain contact with scientists, explorers, research institutions and interested parties." ❑

Major Contributors This Issue
Peter Anderson • Billy-Ace Baker
Peter Barretta Jr. • Abel Shafer

Great Looking APS Patch!
Size: 4" x 4"
Cost: $7.50 each or two for $12
Contact Membership Chair to order.



EA

at Peterman Island

Lgchase